

The use of e-invoices in the public sector and business

Final report

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COVER LETTER

This report is the final report of the 'The use of e-invoices in the public sector and business' study commissioned by the Ministry of Finance and the Ministry of Economic Affairs and Communications and conducted in cooperation with EY. The purpose of the study was to analyse the use of e-invoices in the public and private sectors in Estonia, determine the volumes of e-invoices, highlight the potential obstacles hindering the use of e-invoices by market participants, and develop improvement proposals to expand the use of e-invoices. The final report provides an overview of the results of the study and consists of the following parts:

- ▶ overview of the study;
- ▶ current situation of e-invoices in Estonia;
- ▶ analysis of the experiences of foreign countries in using e-invoices;
- ▶ conclusion.

This is the final report that has been submitted to the contracting entity (Ministry of Finance and Ministry of Economic Affairs and Communications) for getting acquainted with and commending and is not intended for disclosing to third parties or the wider public. The report will be complemented and specified based on the comments.

Please address any questions about the work to Siim Aben, project manager of the study.

Yours sincerely

Siim Aben
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Summary

Summary

This study was commissioned by the Ministry of Finance and the Ministry of Economic Affairs and Communications of the Republic of Estonia and conducted by Ernst & Young Baltic AS. The aim of this study was to analyse the use of e-invoices in the public and private sectors, map the current situation in the e-invoicing market by market participants, highlight obstacles to the wider use of e-invoicing encountered, and make proposals and suggest support measures for increasing the use of e-invoices in the private sector.

E-invoices in the public sector

As of 2019, public sector entities in Estonia are only required to accept e-invoices, and the analysis revealed that central government agencies who outsource their accounting services from the State Shared Service Center accept purchase invoices in the form of e-invoices only. In the case of other public entities, including local governments and their divisions, there is no real aggregated information available on their settlements, but according to the e-Business Register, nearly 90% of divisions have an e-invoice operator, which implies that they are using e-invoices, in particular accept purchase invoices in the form of e-invoices. The available information gives grounds to believe that the remaining 10% of local government divisions are using their local government's centralized accounting services. The engagement team did not identify any public sector entities at the local government level who would accept other forms of purchase invoices in addition to e-invoices, but due to the absence of the relevant data still cannot rule out the possibility completely.

By now, the Estonian public sector has transitioned to e-invoicing almost completely in terms of both the central government as well as the government sector as a whole.

E-invoices in the private sector

There are no reliable statistics on invoices and e-invoicing volumes in the business sector, and the engagement team therefore made approximate estimates based on the data provided to them by parties involved in the e-invoicing ecosystem, i.e., e-invoice operators, accounting firms and business software providers. According to these estimates, the total amount of invoices circulating in the Estonian economy is approximately 75 million per year and the share of e-invoices is ca 45%. Approximately two thirds of e-invoices are invoices sent to households and companies by various telecommunication and infrastructure companies (energy, network services, etc.), i.e., utility bills, which in the case of private persons move to an e-banking environment as e-invoice standing orders. The total volume of invoices in B2B settlements without the invoices moving through e-banking environments is around 52 million and the share of e-invoices ca 23%. In settlements between micro and small enterprises, however, the share of e-invoices is only 5%.

Ca 65–75 million invoices are sent and received in the Estonian economy each year, **about 45% of which are e-invoices**. Most of these are e-invoice standing orders issued to banks. In settlements between micro and small enterprises, the **share of e-invoices is only around 5%**.

Approximately 50% of economically active enterprises in Estonia have sent or received e-invoices, but only 10,800 legal entities have indicated in the e-Business Register that they accept e-invoices and have selected an e-invoice operator, which accounts for ca 8% of economically active enterprises. The total volume of e-invoices in Estonia has increased in recent years, but the number of companies using e-invoices has stayed essentially the same and there are very few new users.

Adoption barriers

The business sector generally adopts e-invoices because of institutional economic considerations. As the transition to e-invoicing in business accounting processes has a greater effect for companies who process more invoices (i.e., medium-sized and large enterprises) and whose invoices are likely to have a higher complexity and value (e.g., many line items, different VAT rates), only companies who consider the personnel expenses associated with the processing of purchase invoices to be too high have an incentive to adopt e-invoices.

Small companies with a small number of purchase invoices, however, often see no economic benefits from implementing e-invoices, as this also usually entails some expenses that are not considered justified. In the case of micro and small enterprises, a lack of awareness about e-invoicing possibilities, suitable operators and adjustments required in their enterprise software often becomes an additional barrier to the adoption of e-invoices. Many companies still use legacy business software, which may not support the sending and receiving of e-invoices. There are also companies who do not use any accounting software, which makes using e-invoices even more challenging.

The adoption of e-invoicing in the business sector has been modest due to poor awareness, low motivation and fears about the complexity of implementing e-invoicing among small enterprises.

As a result of the study, we found that the adoption barriers of companies can be divided into three categories: technological, awareness-related and financial. The providers of accounting services are generally interested in using e-invoices and recommend it to their clients, but in some cases, e-invoicing is still impossible due to a lack of an appropriate interface between the company's sales software and the accounting software used by their accounting service provider.

Business software providers face no obstacles, but their clients' (i.e., companies) strong desire to choose how they settle their invoices prevents them from stepping up their efforts to promote the use of e-invoices.

Considering the above, the engagement team recommends raising the awareness of the potential users of e-invoicing about the possibilities of e-invoices and the benefits involved, and making practical recommendations for their implementation. The key target groups here should be accounting service providers, who are estimated to offer their services for up to 75% of companies, and the companies' accountants, as it is their daily work e-invoices would have the greatest impact on.

E-invoicing market and ecosystem

The Estonian e-invoice operators market can be considered efficient, as there are enough service providers (with a variety of value-added services offered), but the market is not too fragmented between a large number of operators, which would be inefficient for a small market like Estonia. It may still be difficult for a new operator to enter this market, however, as they would need to develop interfaces with all existing e-invoice operators. Such interfaces may prove to be expensive, as existing operators would be required to make developments that are not directly in their commercial interests. In the future, it could be optimal for roaming between operators to be conducted through a single point of contact (e.g., Peppol), whereas so far, the operators have considered such an option expensive and preferred direct connections between operators. A central roaming partner would also make the operators market more accessible for new interested parties.

Supporting the transition to e-invoicing

The implementation of e-invoicing is uneven in the business sector: companies with large settlement volumes have already transitioned to e-invoices, while smaller companies have not, as the benefits of adopting e-invoicing are not always clear in their case.

Greater awareness of the impact, benefits, usage practices and other aspects of e-invoicing would help to increase the use of e-invoicing.

In order to facilitate the adoption of e-invoices, it has been recommended to make e-invoices mandatory, for example, by granting the buyer the right to request an e-invoice from the seller. The parties involved in the e-invoicing ecosystem do not generally support the idea of making e-invoicing mandatory in Estonia and are in favour of giving the entrepreneurs the freedom to choose the form of invoicing. As an alternative option, some market participants would be in favour of a practice based on the Finnish example where all companies whose annual turnover is at least 10,000 euros have the right to request e-invoices from their transaction partners.

Section 7 of the Accounting Act of the Republic of Estonia already stipulates that an accounting source document must be machine-processable (except for the exceptions listed in the act) and it can be therefore argued that the legal right to request an e-invoice is already there. The current wording of the act is, however, ambiguous and extensive explanatory work would therefore be required to implement this idea in practice.

The implementation of e-invoices in a company is often not only a matter of adjusting the enterprise software and concluding a contract with the operator, but may also require other developments and transformation of business processes. One of the options, therefore, is to offer companies broader support for investing in the digital transformation of their business accounting processes, which may include updating their business software, developing interfaces as well as adopting e-invoices. The adoption of e-invoices per se has such a small financial impact that it is not practical to support it separately.

Awareness of the possibilities, benefits and implementation of e-invoicing should be raised among micro and small enterprises as well as the providers of accounting services in order to allay any fears associated with the transition. The increased interest of accountants in e-invoicing would also push enterprise software providers to make this functionality more convenient and user-friendly. We recommend supporting the adoption of e-invoices through supporting the broader digital transformation of business accounting processes, especially in companies where the introduction of e-invoicing also affects other information systems and interfaces have to be developed.

As one of the supporting measures, the e-Business Register could have an option to choose an e-invoice operator and indicate whether the company accepts e-invoices when registering a company.

E-invoicing standards

One of the problems with the implementation of e-invoices is the outdated Estonian e-invoicing standard¹. The Estonian e-invoicing standard has not been updated for years and its limited functionality leads to various problems in processing data for accounting purposes. An EU e-invoicing standard has been developed, but is not widespread in Estonia. As experts believe the implementation of the EU e-invoicing standard would solve many of these problems, we recommend transitioning to the EU e-invoicing standard².

Implementation of the EU e-invoicing standard is seen as an advantage in terms of standardizing e-invoicing processes and increasing the quality of data. A guide (CIUS) supporting the implementation of the EU e-invoicing standard should also be developed.

As implementation of the new standard would mean significant development expenses for enterprise software developers (changes in data content arising from the EU e-invoicing standard necessitate changes in the structure of enterprise software databases, adding the functionality of validating additional data

¹ <https://www.evs.ee/et/evs-923-2014-ac-2017>

² <https://www.evs.ee/et/evs-en-16931-1-2017>

fields, creating and validating an XML file complying with the EU e-invoicing standard, etc.), we recommend supporting such development activities to speed up the transition process. A core invoice usage specification (CIUS) should also be developed.

However, before abandoning the Estonian e-invoicing standard and transitioning to the EU one, it is advisable to carry out an impact assessment of the implementation of the EU e-invoicing standard in different use cases. If the EU e-invoicing standard is implemented, it is reasonable to offer support to enterprise software developers for making the necessary developments, as the cost of these developments would probably amount to around 30,000–50,000 euros and the developers would be likely to postpone them without it.

A reasonable time frame for the implementation of the EU e-invoicing standard is ca 12–18 months, of which six months would be spent on the required developments, followed by a 6–12-month transition period. The aforementioned impact assessment of the different use cases would be added to this time frame.

The analysis also revealed the need for preparing a new usage specification (CIUS) to support the implementation of the EU e-invoicing standard in order to mitigate the risks associated with the implementation of the standard and facilitate its adoption.

Nordic practice

The information collected by the engagement team leads us to one very clear recommendation: the benefits of e-invoices must be explained in detail to all parties in a uniform and understandable manner. The adoption of e-invoices should be made as simple as possible, even for someone not even remotely familiar with the IT world, and entrepreneurs must be left with the opportunity to choose the invoice format.

The list of abbreviations used

Definition	Explanation
B2B	Business to business – from one business to another
B2G	Business to government – from a business to the public sector
B2C	Business to customer – from a business to a customer
CIUS	Core Invoice Usage Specification
DHS	Document management system
EDI	Electronic data interchange
Company	A legal person (public limited company, private limited company) who is not an e-invoice operator or an accounting software provider in the context of this study.
ERP (enterprise resource planning)	A software application used for supporting and automating the accounting and business processes of a business; also referred to as business software.
EU	European Union
EY	Ernst & Young Baltic AS
ITL	Estonian Association of Information Technology and Telecommunications
KOV	Local municipality
Peppol	Pan-European Public Procurement On-Line
PDF	Portable Document Format
Operator	A business providing the e-invoice processing and mediation service
RTK	State Shared Service Centre
RIK	Centre of Registers and Information Systems
UBL	Universal Business Language - and XML-based language for semantic description of business documents
XML	Extensible Markup Language

1. Overview of the study

Ernst & Young Baltic AS (hereinafter EY) conducted 'The use of e-invoices in the public sector and business' study commissioned by the Ministry of Finance and the Ministry of Economic Affairs and Communications. The aim of the study was to analyse the use of e-invoices by business and the public sector, highlight the obstacles preventing wider use of e-invoices, and develop improvement proposals for expanding the use of e-invoices, incl. providing an input for the development of support measures designed for businesses.

According to several studies and analysis conducted on this topic, increasing the share of e-invoices would be accompanied by positive environmental, societal, and economic changes, incl. the following significant ones:

- ▶ Switching to e-invoices will help to save paper³, which is becoming increasingly topical in the context of the EU green and digital transformations⁴ and is also one of EU's official targets.
- ▶ Switching to e-invoices will come with process-based savings in the business sector and in document management in general, as less time will be spent on entering invoices and the risk of errors arising from the human factor will be smaller. Automation of the processes described will result in saving on personnel and administration costs.⁵
- ▶ The real time system will reduce the extent of fraud, as it will also increase general transparency in the physical delivery chain via integration of procurement processes, submission of invoices, and payments into once common system.⁶
- ▶ Switching to e-invoices will help to increase productivity⁷ and can thereby increase the competitiveness of a business.

The data composition of e-invoices enables the parties to a transaction to relatively easily share detailed information about products and services which has been deemed unimportant from the accounting perspective, which is the input information of the afore-mentioned reporting. The prerequisite is improvement of the quality of the data from the input to processing, taking into consideration the entire delivery chain from the manufacturer to the consumer.

As the final outcome of the study conducted, the aim is to find and create opportunities for wider use of e-invoices and, in the longer perspective, for a full switch to using e-invoices. The study must answer the following questions:

- ▶ To what extent have the public sector entities (state accounting entities, local municipality entities, legal person governed by public law, and those accounting entities which are directly or indirectly under the dominant control of any of the above, as well as vendors for the purposes of section 5 of the Public Procurement Act) to which only machine-readable invoices (hereinafter e-invoices) may be issued as of 1 July

³ [The factors influencing switching to e-invoices in Estonia based on the example of small and medium-sized enterprises](#) – p. 34

⁴ Updated Benefits Analysis on the implementation of Directive 2014/55/EU, European Commission, https://ec.europa.eu/cefdigital/wiki/pages/viewpageattachments.action?pageId=82773147&sortBy=date&highlight=Analysis+of+benefits+of+implementing+eInvoicing_.pdf&&preview=/82773147/327713104/SC233_D6.1_Update%20of%20the%20Benefits%20Analysis%20of%20the%20Directive%20201455EU%20implementation_vf.pdf

⁵ ['Tootmisettevõtete raamatupidajate suhtumine e-arvetesse ja nende vähese kasutamise põhjused' \(The attitudes of the accountants of production companies towards e-invoices and the reasons for the limited used thereof\)](#) – p. 50

⁶ [taltech_rte_lopparuanne_ee.pdf \(mkm.ee\)](#) – p. 42

⁷ Updated Benefits Analysis on the implementation of Directive 2014/55/EU, European Commission, https://ec.europa.eu/cefdigital/wiki/pages/viewpageattachments.action?pageId=82773147&sortBy=date&highlight=Analysis+of+benefits+of+implementing+eInvoicing_.pdf&&preview=/82773147/327713104/SC233_D6.1_Update%20of%20the%20Benefits%20Analysis%20of%20the%20Directive%20201455EU%20implementation_vf.pdf

2021 by amendment of the Accounting Act complied with the amendment of the act and capable of accepting e-invoices? Is there still a lot of manual entry, printing of PDF invoices, general sending of PDF invoices? What are the main obstacles and issues in the implementation of the B2G obligation? What are the financial impact and the benefits gained since entry into force of the act (since establishing the obligation to issue e-invoices)?

- ▶ What is the extent of using e-invoices in Estonia (incl. how many are sent, how many are received, which standard is used; specify the number of invoices and the number of users)?
- ▶ Which problems (incl. the issues arising from the standard, user convenience issues, development issues, etc.) have been experienced by the senders and recipients of e-invoices and by the service providers and what has been done to solve the issues (public sector, businesses, business software providers, and e-invoice operators)? Has any of the issues become an obstacle preventing the wider use of e-invoices in the future?
- ▶ How to support a wider switch to e-invoices in the private sector and what could be the intervention logic used by the government? What support do the businesses need? Which target groups should be supported? Add the level of priority of the target groups with explanations. Which activities, developments should be supported? Would it be reasonable to make e-invoices mandatory in the private sector? How? Would it promote a faster switch to e-invoices without burdening businesses excessively?
- ▶ What are the experiences of Nordic countries in switching to e-invoices and what are the most important lessons that Estonia can learn? What is the most important practical advice for expanding the use of e-invoices in a thin country?
- ▶ In the case of establishing an obligation to only use the European Union e-invoice standard:
 - ▶ to what extent would it solve the issues highlighted?
 - ▶ what should be the description and extent of accompanying activities?
 - ▶ the financial impact on all parties (the businesses using e-invoices, the businesses not yet using e-invoices, business software providers, e-invoice operators, public sector)?
 - ▶ suggestions for / analysis of the transition period?
 - ▶ which risks and benefits would this bring to all of the afore-mentioned parties?
 - ▶ does Estonia need to specify its own CIUS (Core Invoice Usage Specification) and what should it entail? The meaning of CIUS based on the official definition: Core Invoice Usage Specification is a specification that provides a seller with detailed guidance, explanations and examples, as well as rules (business rules) related to the actual implementation and use of structured information elements present in the core invoice model in a specific trading situation. An invoice generated based on CIUS must always be compliant with the EN 16931 European e-invoice standard.
- ▶ Continuing to develop the e-receipt, what should the state pay attention to and what should be done differently to avoid mistakes and learn from the experience of implementing e-invoices from the perspective of users as well as service providers? Highlight the best proposals for solutions.

The collection of primary and secondary data conducted in the course of the study provided the inputs required for responding to the research questions as accurately as possible. The following activities were carried out in the course of collecting the data:

- ▶ **Secondary analysis**, which involved collecting publicly available data relevant in the context of the research questions (e.g. studies and reports describing the practice of foreign countries^{8 9 10 11}, analyses published by the European Commission and the divisions thereof¹², academic and research work¹³, various different data published at the local level). The data were synthesised and used as inputs in further data analysis processes as well as for drawing final conclusions in the report. The process of collecting secondary data was selective which enabled specifying and complementing the research methods and data sources, if necessary.
- ▶ **Interviews with representatives of the public and business sectors** to collect detailed information about the current situation of using e-invoices to map the situation e-invoices in the private and public sectors. The samples of the representatives of the public and business sectors used in this study were compiled in a targeted manner, which means that the subjects were selected to the sample from the general population based on the conceptual criteria specified by the contracting authority in the terms of reference and required for successful completion of the study.

The study involved conducted nine interviews with business software providers, five interviews with operators, and separate interviews with representatives of CostPocket, the Estonian Banking Association, the Estonian Chamber of Commerce and Industry, the Centre of Registers and Information Systems, the Tax and Customs Board, and the State Shared Service Centre.

- ▶ **Focus groups interviews**, which involved, also within a purposefully compiled sample, representatives of the public and private sectors to obtain the opinions, positions, and attitudes of the relevant groups concerning the research questions specified by the contracting entity in the terms of reference. Focus group interviews were conducted with the e-invoice working group of the ITL and with members of the accounting services board of the Estonian Assembly of Accountants.

The first stage of the study was focussed on drawing up the samples and interview questionnaires required for the data collection. The questionnaires were drawn up based on the general principle of relying on the research questions specified in the terms of reference and on the outputs achieved in the earlier states of the research process. The information obtained from the research questions and the descriptions of the features of the phenomenon studied helped the research team to develop the questionnaires to measure the processes as precisely as possible and obtain expert assessments to the applications and processes studied through the descriptions of the features of the phenomenon studied.

The study involved collecting primary data by direct inquiries for data and interviews, as well as based on the information obtained from the focus groups. The analysis of foreign countries was based on the publicly available secondary data and direct inputs were also requested from the agencies responsible for e-invoices in the reference countries about the infrastructure, statistics, and potential issues concerning e-invoices.

2. The data collection stages were followed by the data analysis stage, in which different qualitative and quantitative data analysis meth-

⁸ Country Compliance Report: Denmark. Pagero, 2021

⁹ Country Compliance Report: Finland, Pagero, 2019

¹⁰ Country Compliance Report: Sweden, Pagero, 2021

¹¹ E-Invoicing / E-Billing International Market Overview & Forecast, Billentis, 2021

¹² <https://ec.europa.eu/cefdigital/wiki/display/CEFDIGITAL/eInvoicing+Country+Factsheets+for+each+Member+State+and+other+countries>

¹³ eGovernment factsheets anniversary report, European Commission, 2019

ods were used to achieve the best possible outcome. The methodology of data analysis is described in detail under basic methodology (see the following section). The annex to the study (

Annex 1) includes specific activities with explaining and specifying tables about the activities related to the data inquiries and about carrying out the interviews and focus groups, and the research questions of the contracting authority are defined an inputs from the project team are provided to respond to the research questions.

Basic methodology

The basic methodology used to conduct the study is the mixed-method study used in social sciences, which allows the research team to use qualitative as well as quantitative research methods. The basic methodology was selected based on the research questions phrased by the contracting authority and the targets and practical needs arising from the sub-topics thereof.

The multiphase design was selected for the design of this study, as it enables the research team to combine different data collection and analysis methods into a sequenced and mutually complementing process. This approach ensures processing and analysing of different types of raw data separately, but in parallel. On the one hand, it ensures clearing of the data of any contradictions; on the other hand, it allows responding to the contracting authority’s research questions by using the best and most suitable approach. The multiphase design enables the research team to use different qualitative and quantitative approaches in the course of conducting the study by using a method that resembles conducting separate studies.¹⁴

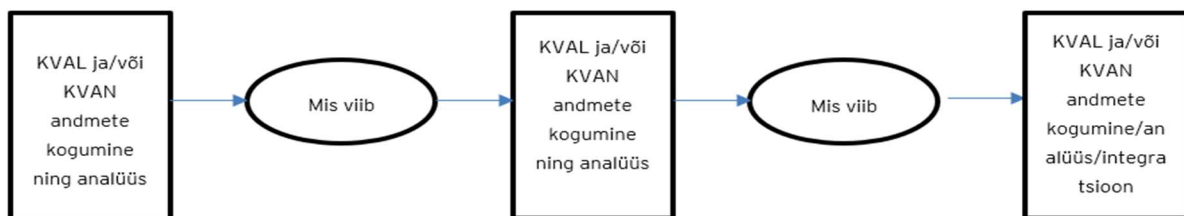


Figure 1. The multiphase design Source: EY 2021.

Qualitative or quantitative data collection and analysis	Which leads to	Qualitative or quantitative data collection and analysis	Which leads to	Qualitative or quantitative data collection / analysis / integration
----------------------------------------------------------	----------------	----------------------------------------------------------	----------------	----------------------------------------------------------------------

The research design used in the study is recursive by nature, which means that qualitative (e.g. Most Different Systems Design in drawing up an overview of the practice of foreign countries) as well as quantitative approaches are used repeatedly and independently from one another.

The approach described ensures the flexibility of the research design in this project, which allows the research team to examine and interpret the outcomes of the study independently from one another in the course of the different stages of conducting the study. Therefore, this design is well-suited for the research questions phrased by the contracting authority and for the wider socio-economic context.

¹⁴ DeCuir-Gunby, J., Schutz, P., (2017). Developing a Mixed Methods Proposal, SAGE Publications

3. The current situation of e-invoices in Estonia

3.1 Nature of an e-invoice

Invoicing processes are important and often work-intensive processes for business organisations and consume a significant share of the resources allocated to financial accounting. One of the options for the automation of such processes is using e-invoices, as it helps to save working time considerably, especially on the side of the buyer and in the case of voluminous invoices.

An e-invoice is a machine-readable invoice which is created, transmitted, approved, recorded, and retained in an electronic environment. It is important to differentiate an e-invoice from other invoices processed with the help of IT tools, such as the documents processed in certain file formats (MS Excel, MS Word, PDF, etc.). The important nuance in the case of an e-invoice is that the data contained in it have the structure agreed on between the recipient of the sender of the invoice (usually in the form of XML (Extensible Markup Language) and are thus machine-readable. Pursuant to Article 2 of Directive 2014/55/EU of the European Parliament and of the council, an electronic invoice means an invoice that has been issued, transmitted and received in a structured electronic format which allows for its automatic and electronic processing. Pursuant to section 7¹ of the Accounting Act, an e-invoice is a machine-readable invoice and subsection 7 (6) defines machine-readability as 'a data stream identifier, which occurs when using the harmonised data description in creation of the data stream so that the IT applications created for this purpose are able to unambiguously identify the internal structure and individual factual allegations of the data stream'.¹⁵ E-invoice has also been defined in Estonia as 'an invoice which moves electronically from the seller to the buyer, never taking a physical form'.¹⁶ Subsection 7¹ (7) of the Estonian Accounting Act defines an e-invoice as a machine-readable invoice¹⁷ that must be compliant with the requirements of the guidelines on machine-processable source documents¹⁸ referred to in subsection 7¹ (10) of the act or with the European standard on electronic invoicing¹⁹.

The Estonian e-invoice standard (EVS 923:2014/AC:2017) is based on the XML format, which is in turn based on the EDI CLASET data model developed by Eurostat. The XML format is created by using the CLASET Toolbox software and CLASET is an EDI message created for the transmission of structured metadata and it enables describing the information exchanged by it.

3.1.1 E-invoicing ecosystem and the parties

E-invoices are only beneficial to the economy and business environment in the extent to which they are used by legal persons in mutual transactions, i.e. if there is an active circulation of e-invoices. The following parties of the e-invoicing ecosystem can be highlighted:

¹⁵ The Accounting Act <https://www.riigiteataja.ee/akt/125052012016?leiaKehtiv>

¹⁶ Tiits, M., (2020). 'E-arvete kasutamise hetkeseis avalikus sektoris', Tallinn University of Technology <https://digikogu.taltech.ee/en/Download/2c0c2db5-b848-4bdd-ab38-49bb489a200c>

¹⁷ <https://www.riigiteataja.ee/akt/125052012016?leiaKehtiv>

¹⁸ https://www.riigiteataja.ee/akt/123042019008?dbNotReadOnly=true&RIIGITEATAJA_AADRESS=https%3A%2F%2Fwww.riigiteataja.ee&RIIGITEATAJA_AADRESS_HALDUS=https%3A%2F%2Fwww.riigiteataja.ee

¹⁹ [EVS-EN 16931-1:2017 - Estonian Centre for Standardisation and Accreditation](https://www.riigiteataja.ee/akt/123042019008?dbNotReadOnly=true&RIIGITEATAJA_AADRESS=https%3A%2F%2Fwww.riigiteataja.ee&RIIGITEATAJA_AADRESS_HALDUS=https%3A%2F%2Fwww.riigiteataja.ee)

- ▶ Parties of an economic transaction – the persons (usually legal persons) that issue and receive e-invoices; the parties of an economic transaction are the businesses and organisations (incl. public sector, third sector) that issue and receive e-invoices.
- ▶ E-invoice operators – the information logistics undertakings which mediate e-invoices between the parties and provide additional services related to the handling of e-invoices (such as processing of invoices). E-invoice operators also convert data formats from one format to another, incl. from PDF documents to machine-readable documents, as well as from one machine-readable format to another, depending on the wishes of the client, for the data to be uniformly understood by different systems.
- ▶ Business software providers – the undertakings that have developed or provide software applications for processing e-invoices (generating, transmitting, receiving, and interpreting to a format suitable for an accounting document).
- ▶ Accounting service providers – the undertakings that process e-invoices for legal person clients.

Below, we provide a detailed overview of the parties to the e-invoicing ecosystem in the Estonian context, specifying the roles and obligations of the different parties in the entire e-invoicing infrastructure.

Businesses and agencies

Sending an e-invoice begins and ends with a business or another organisation involved with the economic transaction. If a business feels that using e-invoices would increase the general productivity of the business due to an increase in efficiency and would enable them to cut the costs of various processes (for example the time required for accounting) and if their partners also use e-invoices, the business is very likely to start using e-invoices, as this is a logical step towards increasing their cost-efficiency (incl. simplifying the work processes and the related saving on expenses, less bureaucracy). However, if e-invoices are not accepted or required by other businesses, the party issuing sales invoices has no motivation for issuing e-invoices. In this case, the larger businesses with more transaction partners are the ones that can influence the e-invoice market and demand e-invoices from their partners.

The business register where legal persons register their e-invoice operators contains information about 10,800 persons. As there are approx. 130,000 active businesses in Estonia according to Statistics Estonia, approx. 8% of the businesses have the capability for accepting e-invoices.

Operators

E-invoice operators ensure the circulation of e-invoices by forwarding e-invoices to the issuers, recipients, and between other operators. E-invoice operators are linked to one another by mutually binding roaming agreements that enable them to send machine-readable invoices from the network of one operator to the network of another operator. Thanks to the roaming service, the e-invoice operator whom the business sending a sales invoice has concluded a contract with and the e-invoice operator whom the recipient of the e-invoice has concluded a contract with may be different.

As at September 2021, there were five e-invoice operators operating in Estonia.

- ▶ **Finbite (the former Omniva invoice centre).** The main function of the Finbite invoice centre is to create and move e-invoices between transaction partners. Purchase invoices can also be confirmed by e-mail or in a smartphone, paper-based on PDF invoices can be digitalised, and a digital archive service is also available. An e-expenditure report solution is also provided and it enables automatic uploading of business expenditure reports into one environment and ensures the proper retention of the reports. Suppliers can generate invoices in the Finbite invoice centre or in their accounting systems. The Finbite invoice centre has automatic interfaces with all common accounting software applications. The Finbite invoice centre supports the Estonian e-invoice format as well as the EU format and Finbite has also subscribed to the

Peppol network, which already allows all businesses included in the Peppol network to send and receive e-invoices²⁰. As at September 2021, the Finbite invoice centre had 4,101 clients.

- ▶ **Telema.** Telema is a leading EDI²¹ and e-invoice operator that has been operating since 2000. The company is connected to several other e-invoice operators, including all operators operating in Estonia, and has also subscribed to the Peppol and Basware networks, which means that they support the EU e-invoice standard. Telema transfers, converts, monitors, and processes EDI documents, such as orders, delivery notes, and invoices. The company has thirty-eight certified software partners and the system of Telema includes over 4,000 stores and over 1,200 suppliers. More than 50,000 e-documents are exchanged every day. The majority of the customers are from Estonia, Latvia, and Lithuania, but the Telema also operates in Finland, Poland, Germany, and twelve other countries²².
- ▶ **E-arveldaja (RIK).** E-arveldaja is an Internet-based accounting software and an operator service provider which is located in the company portal of the e-Business Register. The software application helps businesses to conveniently manage their accounting and is primarily designed for small businesses, NGOs, and foundations. E-arveldaja is interfaced to all operators operating in Estonia and enables sending e-invoices to all, irrespective of the e-invoice operator of the receiving agency.
- ▶ **Unifiedpost (formerly Fitek).** Unifiedpost is an e-invoice operator and has been included in the Peppol electronic document and e-invoicing network since 2017. All Estonian, Latvian, and Lithuanian customers can send and receive e-invoices that are compliant with the EU standard. Unifiedpost is currently also providing the e-invoice operator service to the State Shared Service Centre as the main provider of accounting services to the public sector. Natural and legal persons can use the website to send e-invoices to the financial system of the customer, to the document exchange centre, online bank, and to Finland, and to submit e-invoice orders to the businesses subscribed to the Arved.ee environment²³.
- ▶ **Billberry.** An e-invoice operator that entered the market in 2021 and is aiming to offer to public sector entities and to the private sector an opportunity to send and receive e-invoices for free, having concluded roaming contracts with other operators operating in the market. The e-invoice file (only the Estonian e-invoice standard) is drawn up by the user in the Billberry environment.

Business software providers

Business software providers may be conditionally divided in two categories in the Estonian market based on the functionality offered and the size of the undertaking:

- ▶ 'Large' business software applications are the business software solutions of international providers, such as Microsoft (the Dynamics product family), SAP, and Oracle, which are designed for businesses with large-scale and complicated business processes and data volumes.
- ▶ 'Medium and small' software solutions are the software solutions which have mainly been developed by Estonian software companies and offer solutions for SMEs, but also for many accounting service providers. This group includes Directo, ERPLY, Merit Aktiva, RV-Soft, SAF, SimplBooks, Standard Books, etc.

The so-called large business software applications enable drawing up, sending, and receiving e-invoices. The small and medium business software applications generally also offer this functionality, but there are also those which

²⁰ <https://finbite.eu/et/voimalused/>

²¹ https://en.wikipedia.org/wiki/Electronic_data_interchange

²² <https://telema.ee/telema-teenused/>

²³ <https://www.unifiedpost.com/et-ee/meist>

are not equipped with the capability to receive e-invoices (but may have the capability to send e-invoices, such as Profit).

Accounting service providers

One of the important parties related to e-invoices are accounting service providers that are providing services to the businesses which do not have an accounting function. Based on the estimates gathered by business software and accounting service providers, approx. 75% of Estonian businesses use the services of accounting companies instead of having this function in their own company.

For accounting service providers, the manual entry of PDF invoices is part of their daily work and it is time-consuming for the accountants and therefore especially expensive for the businesses buying services from them. Using e-invoices would reduce the workload of accountants, increasing the efficiency of processing and registering invoices and making the entire process more economical.

There is, however, a difference between accounting bureaus and the persons providing accounting services in a smaller extent. The self-employed persons or businesses who are small-scale providers of accounting services see wider use of e-invoices having a negative effect on their work volume (some of the accounting service providers selling their services in the market are using volume-based pricing, which is based on the manual entry and checking of invoices) and are thus partly against more extensive use of e-invoices.

Larger accounting bureaus believe that wider use of e-invoices will reduce their workload, make accounting error-free, and simplify the process of drawing up reports, thereby increasing the efficiency of accountants. Larger bureaus have been promoting wider use of e-invoices among their clients and their suppliers in recent years, but this has not yet resulted in a significant effect. Therefore, a clear opportunity arising from the law to request the suppliers to submit e-invoices is desired, i.e. basically establishing an obligation to send e-invoices at least to those businesses which have specified in the commercial register that they accept e-invoices. In principle, this is already enabled by the current regulation.

Section 7 of the Accounting Act already establishes that an accounting source document must be machine-readable (except exceptional cases) and thus the current legislation has already made the e-invoice mandatory and enables parties to a transaction to demand sending e-invoices. The study revealed that very few market participants are aware of this and the text of the act itself is also complicated, making it ambiguous according to the market participants.

E-invoicing process

There are, in principle, two options for the circulation of e-invoices between the parties to a transaction:

- ▶ The invoice moves via e-invoice operators. In this case, the issuer of the e-invoice sends the e-invoice issued (drawn up in a business software application or invoice management portal) to the operator providing services to them who will in turn send it to the operator of the recipient of the invoice through whom the invoice will reach the recipient of the invoice. This model is referred to as the square model (the transaction involves four parties).
- ▶ The e-invoice is sent directly within the business software from the seller to the buyer in the form of data exchange between the parties to the e-invoice transaction without involving an e-invoice operator. For example, Merit Aktiva users can send e-invoices to one another without involving an operator within Estonia as well as to other countries where the Merit Aktiva business software is used.

The figure below (

Figure 2) describes in general the different scenarios of the data flows accompanying the movement of e-invoices.

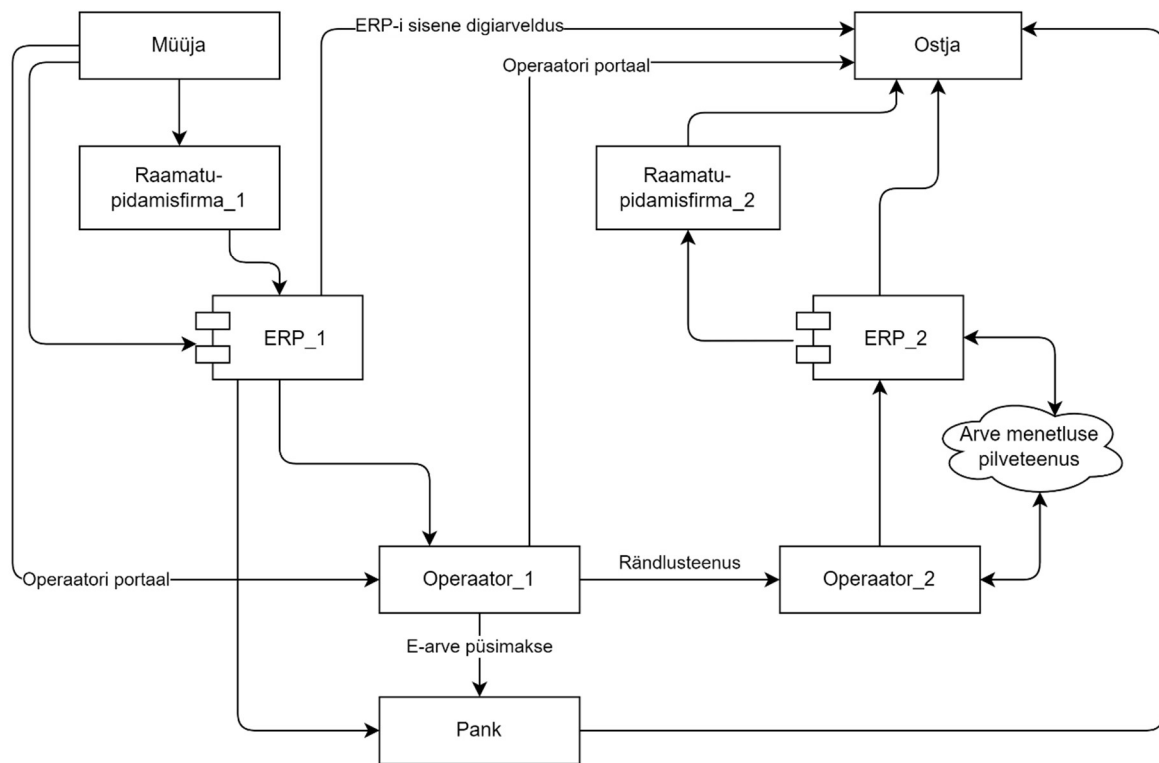


Figure 2. The Estonian e-invoicing infrastructure. Source: EY, 2021.

- Müüja – Seller
- ERP-i sisene digiarveldus – Digital invoicing within ERP
- Ostja – Buyer
- Operaatori portaal – Operator’s portal
- Raamatupidamisfirma_1 – Accounting company_1
- Raamatupidamisfirma_2 – Accounting company_2
- ERP_1 – ERP_1
- ERP_2 – ERP_2
- Arve menetluse pilveteenus – Cloud service for processing invoices
- Rändlusteenus – Roaming service
- Operaator_1 – Operator_1
- Operaator_2 – Operator_2
- E-arve püsimakse – E-invoice permanent payment order
- Pank – Bank

3.1.2 E-invoices in the public sector and the B2G e-invoicing process

In the Estonian private sector, e-invoices have been taken into use in two stages:

- ▶ In 2017, it was made mandatory for public sector agencies to receive e-invoices if a private sector business wished to issue one.
- ▶ As of 1 July 2019, only machine-readable invoices may be submitted to the public sector. The invoices submitted to public sector entities must be compliant with the guidelines for machine-readable e-invoices which specify the format of an e-invoice and the technical requirements, which are compliant

with the Estonian e-invoice XML format and description specified in the Estonian e-invoice standard and the EN 16931²⁴ EU standard.

By the respective amendments to the Accounting Act, Estonia started using the EU e-invoice standard in parallel with the Estonian e-invoice standard.

In the public sector, e-invoices are used in two different manners:

- ▶ the invoicing of central government agencies (ministries, state agencies) is mainly organised through the State Shared Service Centre (RTK).

The RTK which mainly serves central government agencies (approx. 200 agencies) has entered into a contract with an e-invoice operator in the name of those agencies and is processing all invoices as e-invoices. As the RTK is providing a comprehensive accounting service, those agencies have fully switched to using e-invoices and are not using any other types of invoices (paper-based, PDF). The only known exception is the Ministry of Foreign Affairs, which manually digitalises the invoices received from foreign countries instead of using the opportunity to receive e-invoices via the international Peppol network, for example.

- ▶ Other public sector invoicing (incl. local municipalities)

The agencies that are not central government agencies and that form approx. 93% of the total number of public sector agencies organise their invoicing independently. The national register of state and local government authorities (part of the e-Business Register) includes 2,446 agencies and most of those agencies have an e-invoice operator.

The references to e-invoice operators provided in the e-Business Register enable to indirectly assess the use of e-invoices. However, having referred to an operator in the register does not automatically mean that the agency only uses e-invoices. Yet, according to the RTK, all Estonian public sector authorities only accept e-invoices. There are also some authorities that have not specified an operator (11%), but those are mainly local government authorities that take care of their accounting at the local government level. The table of e-invoice recipients includes 2,446 agencies and comparing this list to the operators specified in the e-addresses in the e-Business Register of RIK, we obtain the following results:

Table 1. Distribution of agencies by e-invoice operators (excerpt from the table of e-invoice recipients)

Indicator	Number	Weight
Total number of agencies (as at August 2021)	2,446	100%
Incl. those specified as having an operator:	2,172	89%
Finbite	1,354	62%
e-arveldaja	310	14%
Unifiedpost	412	19%
Telema	96	4%
Those that have not specified an operator	274	11%

Based on the guidelines for sending e-invoices, the Ministry of Finance has drawn up three conceptually different methods for drawing up and sending e-invoices to the public sector:

- ▶ **The sender of a sales invoice can use a business software (ERP)** that is interfaced to the software of an e-invoice operator and the sales invoices are drawn up and sent in the XML format compliant with the

²⁴ <https://www.evs.ee/et/evs-en-16931-1-2017>

Estonian e-invoice standard. The recipient of the invoice receives the e-invoice sent in the invoice management portal of the operator or in their accounting software or in a document management system (DHS) equipped with the capability to receive e-invoices and the purchase invoice management functions required by the agency, incl. confirmation with generating accounting entries and archiving.

- ▶ The issuer of a sales invoice does not have access to business software and the sales invoices are drawn up and transmitted in an invoice management portal interfaced with the software of an e-invoice operator in an XML format compliant with the Estonian e-invoice standard. The recipient of the invoice receives the e-invoice in the invoice management portal of the operator or in their ERP or in a DHS equipped with the capability to receive e-invoices and the purchase invoice management functions required by the agency, incl. confirmation with generating accounting entries and archiving.
- ▶ **The third option involves sending an e-invoice to a public sector entity by using an invoicing process**, in the case of which there are special rules applicable to the format and submission of the machine-readable source document established by an act of law or a regulation adopted on the basis thereof, which enable the sender of the sales invoice to transfer the e-invoices via a direct interface between their business software applications. This option is currently provided by the Merit Aktiva business software.

3.1.3 E-invoices in the private sector and the B2B e-invoicing process

While it is compulsory for the public sector in Estonia to send e-invoices, no such obligation applies to the invoicing between private sector entities. Thus, sending e-invoices is voluntary in the B2B context in Estonia and e-invoices form approximately 45% of all invoices exchanged between private sector entities, based on different assessments (see sub-chapter 3.2 for a detailed overview).

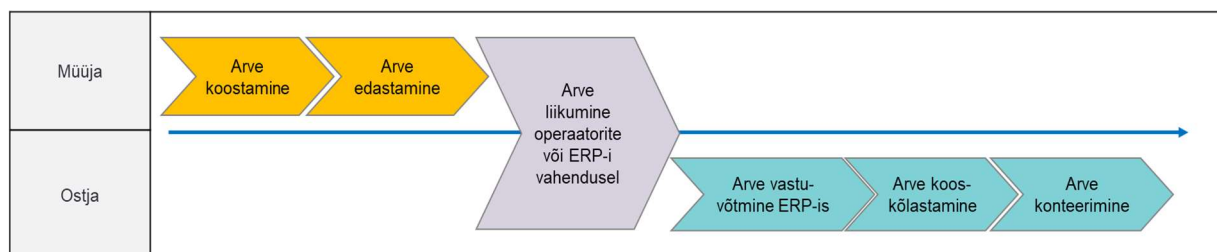


Figure 3. The process of sending B2B e-invoices. Source: EY, 2021.

Seller	Drawing up the invoice	Issuing the invoice	Movement of the invoice via operators or ERP			
Buyer				Receiving the invoice in ERP	Approving the invoice	Registering the invoice in accounting

Businesses can use two different methods to send e-invoices in Estonia:

- ▶ **By using a business software application which is integrated to an operator service provider.** In this case, the sales invoice is drawn up in the business software and transmitted to the customer by using the square model. In most cases, the business enters into a contract with an operator and configures their business software to send and receive e-invoices via the respective operator. In some cases, the business software provider has already concluded a contract with an operator for the client and the client is not required to communicate to the operator.

- **If there is no access to business software, e-invoices can also be sent from the portal of the operator without using business software.** In this case, the sales invoice is drawn up in the e-invoice environment of the operator, where the details of the sales invoice are entered manually, and the invoice is sent to the customer as an e-invoice.

3.2 Volumes of e-invoices

The assessment of the volume of invoices conducted within the framework of this study was based on a previously conducted detailed mapping of the volume of invoices, which was used to deduct the potential current indicators taking into consideration an increase in the volume, which was in turn compared to the more accurate volumes or volumes of similar accuracy received from operators and business software developers. The volume found is simply the assessment of an experienced expert of the field of e-invoicing and accounting who was involved in the project.

The volume of the invoices circulating in the Estonian economy annually is estimated to amount to approx. **75 million invoices. E-invoices are believed to form approx. 45%** of this figure, i.e. there is approximately 35 million e-invoices (B3B and B2C invoices).

The table below presents the estimated invoice volumes by the method of generation, transmission channel format, and method of processing as a purchase invoice.

Table 2. The estimated volumes of the invoices circulating in the Estonian economy (millions of pieces)

Total number of invoices	75					Legal persons	38	Private persons	37
Method of generating sales invoices		Channels of sales invoices		Formats of sales invoices		Technical processing of purchase invoices		Receipt of purchase invoices	
ERP	48	Operators	21	E-invoice	35	The e-invoice does not require processing	12	Online bank	23
Billing applications	15	Direct links between ERPs	1	PDF	37	Digitisation	9	Email	11
Invoice portals	1	Direct links to the bank	14	Paper	4	Scanning + digitalisation	1	Regular mail	3
Office software	10	Directly by e-mail	36			Received by e-mail	16		
Manually on an invoice form	1	Directly via a postal service	2			Hand-delivered	1		
		Regular mail	1						

As the table shows, roughly 48 million of the approx. 75 million invoices are generated in business software applications (ERP), 15 million in invoicing systems (systems specifically designed for the clients with a high volume of invoices), and a considerable number of invoices are also drawn up by using traditional office software. The sales invoices generated move via different channels and in three possible formats: e-invoice, PDF invoice, or paper invoice. In the sales channels, the e-invoice flows are mainly divided between two channels: the invoices issued from business software and billing applications that move to operators and banks (all combinations are possible).

The generating methods, channels, and formats of sales invoices are illustrated in the figure below (Figure 4).

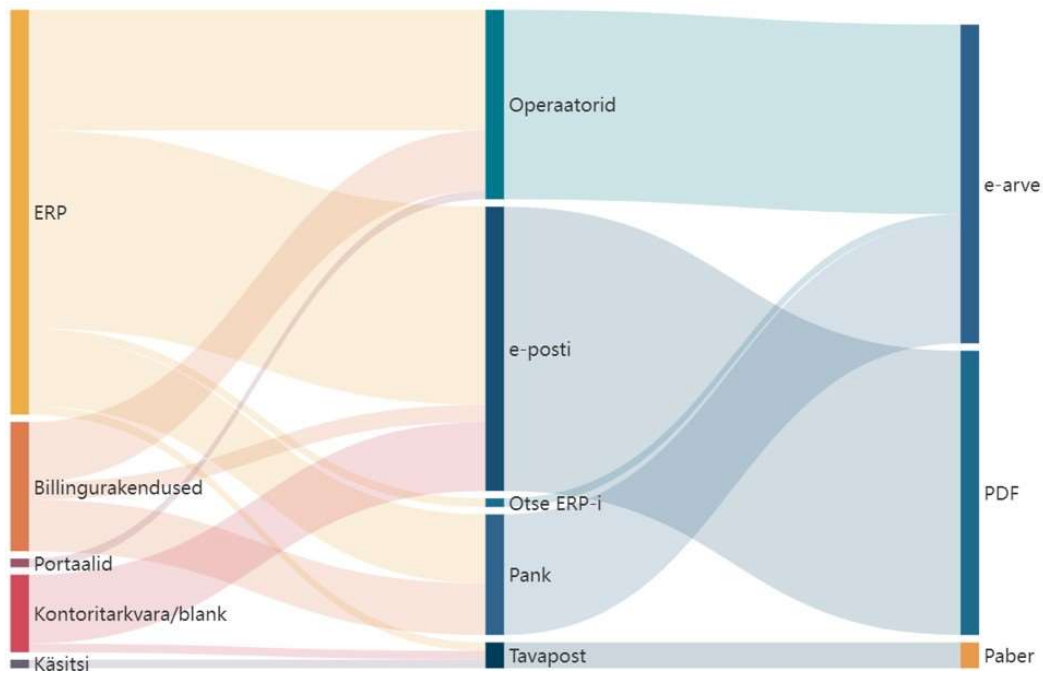


Figure 4. The scheme of the movement of invoices generated in different formats in sales channels

ERP – ERP

Operaatorid – Operators

e-arve – e-invoice

e-posti – e-mail

Billingurakendused – Billing applications

Portaalid – Portals

Kontoritarkvara/blank – Office software/blank

Käsitisi – Manually

Otse ERP-i – Directly to the ERP

Pank – Bank

Tavapost – Regular mail

PDF – PDF

Paber – Paper

The largest issuers of e-invoices are the undertakings providing telecommunication, infrastructure, and utility services whose total customer base basically covers all businesses, households, and private individuals in Estonia. As those undertakings submit most of their invoices in the form of e-invoice permanent payment orders, there is official statistical data of the Bank of Estonia available about this (see Figure 5). Other assessments originate from e-invoice operators and accounting service and business software providers.

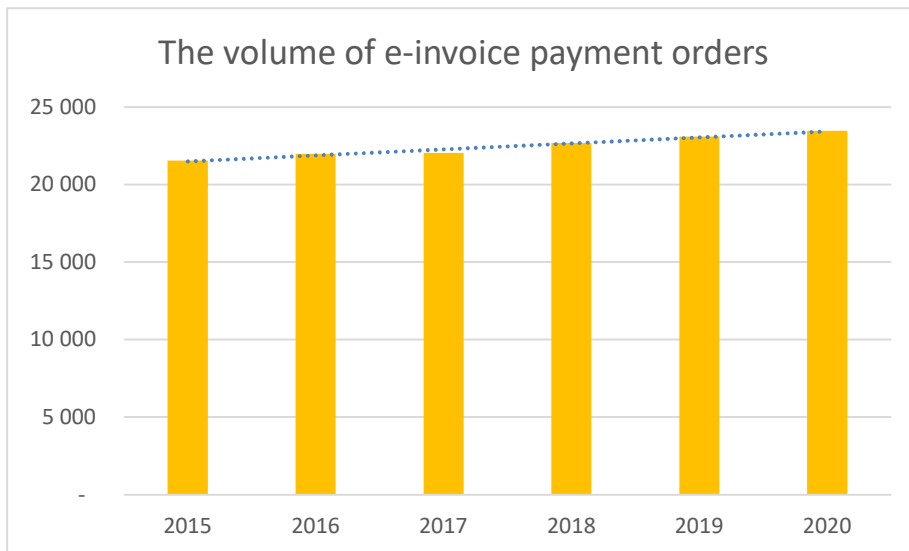


Figure 5. The volume of the e-invoice payment orders of Estonian commercial banks (thousands of pieces)
Source: Bank of Estonia

E-invoice permanent payment orders are, by nature, e-invoices, but are mainly used by private individuals. Thus, the share of the e-invoices (approx. 45%) must be assessed in the light of this fact and it must be kept in mind that in the invoicing between businesses, those invoices form approx. 32%, compared to the share of 62% in the invoices sent to private individuals (on the basis of one of the most-used business software applications, however, only 5% of all users of the application exchange e-invoices).

In purchasing channels, invoices are received by the buyers by e-mail, via an operator, bank, or regular mail. Furthermore, approximately 1 million invoices move directly within certain business software applications. In the case of legal persons, the situations of using e-invoices without processing must be separated from digitalisation of a purchase invoice by an operator.

The movement of invoices in purchase channels is illustrated by the figure below (Figure 6).

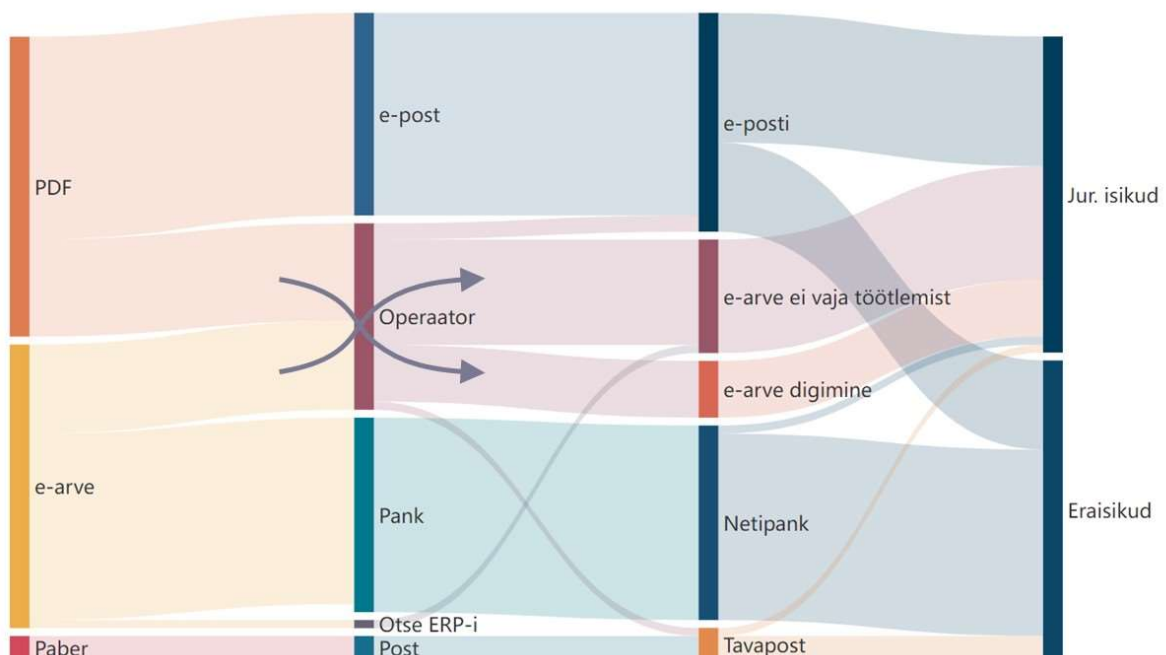


Figure 6. The scheme of the movement of invoices upon receipt

PDF – PDF

e-posti – e-mail

Operaator – Operator

e-arve ei vaja töötamist – e-invoice does not need processing

e-arve digimine – digitalisation of the e-invoice

Jur-isikud – Legal persons

e-arve – e-invoice

Paber – Paper

Pank – Bank

Otse ERP-i – Directly to ERP

Post – Mail

Netipank – Online bank

Tavapost – Regular mail

Eraisikud – Private individuals

3.3 Obstacles which prevent the wider use of e-invoices

Switching to e-invoices may come with potential benefits for businesses as well as the economy as a whole. However, various studies show that the spread of e-invoices in the Estonian private sector is low compared to the total volume of invoices. Wider use of e-invoices is prevented by several factors that are different for the different parties of the e-invoicing ecosystem. In this chapter, the obstacles preventing the wider use of e-invoices are first divided by the content. Then, in separate sub-chapters, an overview is provided of the obstacles identified in the course of the study from the perspective of different parties.

Based on the content, the obstacles preventing the wider spread of e-invoices may, in general, be divided in four²⁵:

- ▶ Technological obstacles

Technological obstacles include those situations in which the business lacks the technical preparedness for issuing or receiving an e-invoice. This may be due to the lack of the required business software or using a business software application with a limited functionality.

Technological obstacles also manifest in the form of the process of taking into use, sending, and receiving e-invoices being complicated and burdensome for the end user. The user interfaces of different business software providers are of different levels of complexity and may require the user to be highly IT literate. There is currently also no inter-system standardisation that would enable the users of different technological solutions to send and receive e-invoices based on a similar logic.

In the case of some businesses, the complexity arising from the multitude of different information systems and from the business processes may also be classified under technological obstacles. An example of this is a situation in which the sales and warehouse systems of a business are not integrated with a business software application, which is why the invoices issued to customers from the sales system should be generated again in the business software.

- ▶ Awareness-related obstacles

The majority of the business software applications do, however, enable the processing of e-invoices, but this function is often not used by businesses. This is due to the lack of awareness of the possibilities for improving the work processes and data quality by using e-invoices.

- ▶ Motivation-related obstacles

One of the reasons for the limited use of e-invoices is the low motivation of businesses as well as business software providers. If the volume of invoices (especially received invoices) is low and the invoices are simple by nature (few lines and elements to be recorded), processing the invoices is not particularly resource-intensive and there is no need for switching to e-invoices. The above mainly applies to the small and medium-sized enterprises, which are not using accounting services and generally exhibit a low level of digitalisation, there are no internal confirmation rounds, and the enterprises tend to use business software applications with limited functionalities or do not use such software. Smaller accounting service providers who have a limited circle of clients with a relatively little transactions also prefer using traditional invoice management methods (e-mailing PDF files).

- ▶ Financial obstacles

²⁵ Source: The interviews and focus groups conducted by EY in the course of the study

A business may deem the expenses arising from using e-invoice too high, as a service fee must be paid to the operator for the issuing and receipt of each invoice, which may be deemed excessive. Different operators use different pricing policies, which are not made public, referring to business secret. It is, however, known that several operators charge fees from the sender as well as the recipient of an e-invoice.

In practice, the obstacles highlighted above are usually combined. First, the financial side is examined (businesses are accustomed to the fact that sending PDF invoices by e-mail is free and any fees charged create a psychological barrier). Secondly, the convenience of establishing a system for sending or receiving e-invoices is examined – businesses usually do not bother making such configurations in their software and it is often even ‘bothersome’ for the businesses using the services of an accounting service provider to log in to the e-Business Register and confirm that they accept e-invoices. Thirdly, businesses are lacking the motivation and willingness for in-depth consideration of the issue of e-invoicing.

Below, we are discussing the issues related to the use of e-invoices by the different parties to the process based on the interviews conducted in the course of the study, the data collected, and the analytical conclusions and assessments of the project team.

3.3.1 Obstacles experienced by businesses

As it has been mandatory to use e-invoices in the public sector in Estonia since 2019, this chapter is mainly focussed on the factors restricting the wider use of e-invoices in the private sector. The use of e-invoices depends on all parties to the process, but for e-invoices to gain ground in the private sector, businesses must first start sending and accepting them. The study revealed that while e-invoices are relatively common and used in the daily invoicing among large businesses, many micro and small enterprises have no direct need for using e-invoices. It is difficult for businesses themselves to quantify the directly measurable benefits arising from the use of e-invoices and if the number of invoices is low, the financial, but in the case of a business with a low level of IT literacy, also the time resource required may not outweigh the saving accompanying using e-invoices, especially on the side of receiving purchase invoices. Receiving some e-invoices may even prove more expensive for a business than receiving PDF invoices by e-mail. On the other hand, it should be kept in mind that e-invoices primarily create an economic effect on the side of the buyer where entering invoices into the system may be a very time-consuming activity.

The author of a thesis defended at the Tallinn University of Technology in 2020 measured and compared the time required for processing PDF and e-invoices and quantified the results in euros (813 purchase invoices were measured, of which 728 were e-invoices).

	Processing cost, EUR*	
	Paper and PDF invoices	E-invoice
Receipt	0.15	0.41
Entry into the ERP	0.90	0.15
Archiving	0.09	0.06
Total	1.14	0.62

* In the case of e-invoices, the cost of receiving consists of the total monthly fee of the eFlow invoice management system and EDI Supplier module of the operator Telema in 2019 was 228 euros per month.

The thesis proceeded from the average wages in the sector in Q1 and Q2 of 2019 according to Statistics Estonia and the average wage used in the study was 0.15 euros per minute. According to CV Keskus, the average monthly wage of an accountant in Estonia in October 2021 was in the range of 1,400–1,800 euros (gross). The wage of the accountant used in the thesis was **10** euros per hour, rounded to **0.17** euros per minute.

Thus, the data provided in the table may be multiplied by **1.2** to find the figures of 2021. Thus, the cost of processing of PDF invoice is **1.37** euros and the cost of processing an e-invoice is **0.74** euros, with the difference amounting to **0.63** euros per invoice.

If the monthly fee for a business software application is 30 euros, for example, the business must receive at least 48 invoices per month, which is a relatively high number of purchase invoices for a micro or small enterprise.

This example cannot be approached as a complete generalisation, as the purchase invoices of businesses may differ greatly and some invoices received as e-invoices may also require processing due to the weakness of the Estonian e-invoice standard.

EY assesses that the financial gain from using an e-invoice is **1-2 euros** and the amount of money and time saved by switching to e-invoices depends on the volume of purchase and sales invoices, the complexity thereof, and the functions and pricing of the business software.

Research conducted at TalTech in 2019 highlighted that almost 57% of the Estonian production companies (mainly micro and small enterprises) did not use e-invoices, as there was no need for this: e-invoices were not accepted by the foreign partners and the existing technical solutions did not meet the needs of the company²⁶. Thus, it may be concluded that e-invoices are used in Estonia in the B2B context, but the increase in the volume of e-invoices is lower than would be required to increase the efficiency of economic agents due to different obstacles, low awareness, and partly also direct lack of motivation.

There is a certain 'conflict of motivating factors' in the process of sending and receiving e-invoices, in which many businesses would prefer to receive e-invoices but their transaction partners lack the motivation and need for issuing e-invoices, especially if their business models do not include voluminous and complex processing of purchase invoices.

Thus, for smaller businesses with a low volume of sales and purchase invoices, the greatest obstacles preventing the use of e-invoices are the inconvenience of the process (the user interface and, in some cases, processing of purchase invoices may appear inconvenient) and the financial cost (businesses are not prepared to pay for sending and receiving e-invoices), plus the process of choosing the e-invoice operator which is sometimes burdensome and may seem illogical. For example, some software applications allow for choosing between several different e-invoice channels, which makes it difficult to decide which operator to choose. Finding and configuring the location of the e-invoices received in the computer may also be confusing. The interviews revealed that the more convenient, logical, and faster the process of using e-invoices, the greater the likelihood of businesses starting to use it.

For small enterprises, the entire processes of generating/sending and receiving/processing invoices is problematic (see Figure 3). Drawing up an invoice is not a familiar procedure for a new business and new businesses often issue their first invoices in a hurry, using any means and possibilities in their reach (it is still possible to even issue invoices on paper by using invoice forms). Purchase invoices are treated the same: A PDF invoice received by e-mail is saved in the so-called 'accounting folder' somewhere in the entrepreneur's personal computer, the payment is made via the online bank, and the process is forgotten about until the moment of drawing up the annual accounts. One of the options is using a business software application, but there is no pressure for doing so (which may in turn result in a failure to file annual accounts, as it is difficult to put the annual accounts together merely based on the bank statement and files).

Another issue which may arise in the case of a very low volume of invoices is double accounting, as there is a risk of issuing one invoice twice to a supplier, if there are e-invoices complied for a few suppliers and the rest receive traditional PDF invoices. A Master's thesis defended at the Estonian University of Life Sciences in 2020 also highlighted that in the case of agricultural undertakings, for example, the volume of invoices is low, due to which the

²⁶ Krassilnikova, E., (2019). 'Tootmisettevõtete raamatupidajate suhtumine e-arvetesse ja nende vähese kasutamise põhjused' (The attitudes of the accountants of production companies towards e-invoices and the reasons for the limited used thereof), Tallinn University of Technology.

undertakings would not enjoy a resource gain and ‘the low technological preparedness of the business forces them to simultaneously use several solutions in the case of issuing e-invoices (e.g. the business software and invoice management portal) which is time-consuming and does not motivate to use e-invoices’.²⁷ According to the Tax and Customs Board, the low level of use may also arise from the unwillingness of some businesses to properly observe their reporting and accounting obligations.

The Estonian Chamber of Commerce and Industry has also assessed that there is currently no need for the Estonian micro and small enterprises to send and receive e-invoices and the undertaking also often lack the required technical capability due to the general complexity of the afore-mentioned invoice management. The low use described also arises from the fact that the awareness of small businesses of the nature of e-invoices is low. There is also no comprehensive vision of the benefits arising from the use of e-invoices to the wider economy. While the large companies in the Estonian market tend to use e-invoices, the micro and small enterprises, which form over 90% of the legal persons in Estonia, have often not even heard about e-invoices and are thus also unable to quantify the benefit arising from using them.

Internal technological interfacing at businesses and the use of different software solutions may also have a negative impact on the use of e-invoices. For example, the commercial and industrial undertakings that use several different internal systems may not be able to align those different interfaces and systems well enough for making using e-invoices as convenient as possible or the Estonian e-invoice standard does not enable communicating as much information as necessary (the study showed that it is not possible to enclose documents to e-invoices that may be required in the case of certain product groups).

The use of e-invoices may also be influenced by the export market of a business. If the main markets of a business include countries with a lower level of digitalisation, their trade partners may not accept e-invoices and thus it would be unreasonable for the undertaking to implement two different systems.

One of the potential issues arises from the fear of the businesses that a wider use of e-invoices would be accompanied by state supervision and control over undertakings and their accounting. Wider or mandatory use of e-invoices may make businesses feel that the state has too much control over their operations. The risk of a third party being able to use the data in their favour also increases.

3.3.2 Obstacles experienced by business software providers

The large Estonian business software providers included in the study have mostly developed the functionalities for processing e-invoices in their solutions. However, activation of an e-invoice functionality requires a certain amount configuration and calls for administrative operations by the business or accountants, which are deemed complicated and are also relatively time-consuming. For example, a business may have concluded a contract with e-invoice operator 1, but their accounting service provider who uses a business software application may have a contract with another e-invoice operator. In this case, the business must undertake the burdensome process of changing their e-invoice operator to be able to use e-invoices. Smaller business software applications are often equipped with the capability to send e-invoices, but they may not enable the receipt of e-invoices.

Business software providers (whose solutions enable sending and receiving e-invoices) did not highlight any specific issues or obstacles in the course of interviews or focus groups and tended to believe that they were not the party preventing a wider use of e-invoices. Such business software developers are also not expecting support from the state when it comes to making e-invoicing related developments in their software applications. It was, however, found that the other links of the chain of using e-invoices may have issues.

²⁷ Jõesaar, Anne-Ly,. (2020). ‘E-arvete kasutamist mõjutavad tegurid Eesti põllumajandusettevõtete näitel’ (The factors influencing the use of e-invoices on the example of Estonian agricultural undertakings), Estonian University of Life Sciences.

Providers of business software applications with limited functionalities whose financial and technical capability is also lower believed that they may need financial support from the state for the required developments if e-invoices became mandatory.

As described above, one of the issues arises from the fact that businesses are not under any pressure for wider use of e-invoices, as there is no direct need or obligation and many undertakings do not feel that they would gain from using e-invoices due to their low volumes. If a business feels this way, they will not be sending e-invoices or require them from their contractual partners.

The obstacle arising from the low level of intuitiveness for the process of using e-invoices for the user who is either forced to or wishes to start using e-invoices is also linked to this. If the entire process of switching to e-invoices were simple and logical for the user, it would increase the volume of e-invoices. One solution would be making sending and receiving e-invoices the default preference in the business software so that the user would not be required to separately express their intent or specifically configure the software.

As business software providers did not generally believe that it would be complicated to start using e-invoices in their products, this may partly be a prejudice of the users, arising from their low awareness of the level of complexity of switching to e-invoices. As one solution, the Estonian Assembly of Accountants could describe the vision of an ideal solution, on the basis of which business software providers could bring the e-invoice activation and use functionality of their software to a level that would satisfy even the most demanding seekers of convenient user experiences.

3.3.3 Obstacles experienced by accountants

Accounting service providers serve almost half of all Estonian businesses and are estimated to come in contact with 20% of the total volume of e-invoices. Accounting bureaus mainly serve smaller and medium-sized enterprises whose invoice volumes are smaller. However, the number of such businesses is high in the Estonian context, amounting to an estimated 75,000 businesses. Accounting service providers have attempted to sway their clients and their suppliers to use more e-invoices to make their work simpler, but this activity has not had a significant effect. Accountants themselves see making e-invoices mandatory in the private sector as a solution, for example by giving the buyer the right to request an e-invoice from the seller if the business is marked as an e-invoice user in the commercial register.

Thus, accounting service providers have a significant role in the use of e-invoices. Processing of purchase invoices forms a significant part of the time spent on providing their services, which is why accounting service providers are generally interested in a wider use of e-invoices.

While the representatives of business software providers assessed their services as user-friendly and convenient, the focus group interviews with accounting service providers revealed that the use of accounting software applications, which makes the process more complicated than it should be, is one of the issues. Proper configuration of the e-invoice functionality also calls for certain technical skills for the process of sending and receiving purchase and sales invoices to be smooth. Thus, a contradiction between ERP developers and end users can be observed.

Another issue for the accounting service providers is the issue of production sites which has not been solved in Estonia, i.e. there is no central register of places of business in Estonia. For example, if a commercial undertaking has dozens of stores in Estonia (so-called places of business) that are all operating under the same legal person, it is not possible to address an e-invoice to a specific place of business. This issue is currently solved by the applications developed by EDI service providers (Telema, EDISOFT) for order management and the e-invoice itself is not actually the main source document required for the efficient functioning of the business processes of wholesalers and retailers in this case.

Another issue is the lack of interfaces of the business processes and business software related to issuing invoices. For example, businesses often issue invoices in a certain software application and send the invoice to the customer and the accountant. In this case, the outgoing sales invoice is not located in the accounting system and data interoperability issues may arise.

Another issue identified was the potential psychological reluctance among accountants to using e-invoices, as this may require them to step out of their comfort zone and a wider use of e-invoices would also directly mean a decrease in the workload of accountants from the temporal perspective, which why they expect to start earning less in the case of volume-based pricing. All of the above gives rise to a decisive opposition against a wider use of e-invoices.

3.3.4 Obstacles experienced by operators

There are five e-invoice operators operating in Estonia. Even though there is no official statistical data, Unifiedpost is known to cover the largest volume of invoices, mediating approx. 50% of invoices. The next largest operators are Finbite and Telema, the latter of which has specialised on electronic document interchange (EDI) in the field of invoices, among other things. The state-owned e-arveldaja is providing the e-invoice operator service, but little added value services.

The e-invoice operators use different pricing models and their service portfolios include several added value services in addition to mediating e-invoices, such as digitalisation of invoices (converting PDF invoices to e-invoices), automation of the coordination rounds of invoices, etc.

In most cases, a business enters into a contract with an operator and configures their business software accordingly. Some business software providers, however, take care of this for the client, in which case the client is not required to conclude a contract with an operator.

Taking into consideration the current market of operators, it can be stated that the competition is reasonable, there is no monopoly position and the market is not too fractured, which could pose a problem in a small market.

Yet, it may be difficult for a new operator to enter the market, as the currently existing operators would also be required to undertake developments for the roaming service, which may give rise to the question of who should cover those costs. After switching to the EU e-invoice standard, it may prove reasonable to use the Peppol network for the roaming service, in which case the e-invoice operator should enter into an Access Point contract. From the economic perspective, this may be more feasible compared to the current situation, in which all operators must create and maintain their own data exchange channel.

As the operator service is a so-called business service, in the case of which anyone interested may provide their services, it may be asked whether or is justified for the state to offer the operator service in competition with private operators. Based on the input collected in the course of the analysis, it may be stated that if the operator service provided by the state is limited to the e-invoice mediation service, it should not be an issue. The provision of various different added value services related to e-invoices by the state is, however, not deemed appropriate. It would be a good idea to consider, though, whether it would be reasonable for the state to continue providing two operator services in the future, as the services provided by the Centre of Registers and Information Systems (RIK) and Omniva (under the name of Finbite) are partly overlapping. After the switch to the EU e-invoice standard and potentially to using the Peppol network, the current roaming may remain functioning in parallel, and in this case, it might even be reasonable to keep the old channels in use, for example, through the e-arveldaja of RIK.

3.3.5 Overview of the obstacles preventing a wider spread of e-invoices

Wider use of e-invoices in Estonia is currently limited by the dysfunctional market in which the state has placed businesses under the obligation to send e-invoices to state agencies, but the spread of e-invoices in the private sector remains low due to various different obstacles. Businesses lack clear motivation for switching to e-invoices.

The awareness of e-invoices among smaller businesses may also be deemed lacking. Furthermore, using e-invoices in ERP may seem technically complicated and time-consuming for some businesses and accounting service providers in the current situation, while ERP developers believe that the functionality and user convenience of the user interfaces of their applications meet the expectations and needs of the end consumer. The table below provides a summarised overview of the obstacles preventing switching to e-invoices by the parties as well as obstacle types.

Table 3. The obstacles preventing the implementation of e-invoices

Party	Obstacle		
	Technical	Awareness	Financial
Businesses	<p>The different IT systems of a business (warehouse, sales, production) may not be compatible, as a result of which it would be burdensome for the business to use e-invoices and switching to e-invoices may not result in the expected savings.</p> <p>The process of sending and receiving e-invoices may be too complicated, time-consuming, and confusing for the business due to the high number of business software applications and operators. The complexity and lack of intuitiveness of the user interfaces of business software applications may also cause problems for the end user.</p>	<p>The level of awareness of businesses of the nature of e-invoices and details concerning the use thereof is low.</p>	<p>For micro and small enterprises, sending e-invoices may not be feasible from the economic perspective, as their purchase invoice volume is low.</p> <p>For larger enterprises or those using several different business software applications, it may disproportionately expensive to make their systems interoperable.</p>
Business software providers	<p>If the configuration process and user interface are complicated, the business may not start sending or receiving e-invoices.</p> <p>It is also possible that while the business software used at a company enables sending e-invoices, it does not enable receiving such invoices.</p> <p>There is no central register of places of business.</p>	<p>Business software developers may not be aware of the wishes or potential issues of end users which may prevent the use of e-invoices.</p>	<p>The issues of the business software providers with smaller turnovers and circles of users are concerned with different standards and interfaces that require constant attention and the updating and development of which may be significantly time-consuming and expensive.</p>
Accountants	<p>Accountants partly share the issue of businesses of accepting and using e-invoices being too complicated and time-consuming, which makes them forego this option.</p>	<p>Lack of awareness of the nature of e-invoices, low IT literacy, and psychological fear of a decrease in their workload due to an increase in the volume of e-invoices.</p>	<p>There are no direct financial obstacles which would prevent a wider use of e-invoices.</p>

3.4 Supporting the transition to wider use of e-invoicing

E-invoices are estimated to form 45% of all invoices in the entire Estonian economy, but this figure varies greatly by sector. As it is mandatory to issue e-invoices to the public sector, almost 100% of the invoices issued to this sector are e-invoices; the share of e-invoices is also high in the case of large-scale invoicing for telecommunication and utility services, especially in the form of e-invoice permanent payment orders used for invoicing private individuals. The use of e-invoices among micro, small, and medium-sized enterprises is significantly less common, though (see the respective obstacles in sub-chapter 3.3). There are also differences between different sectors: for example, e-invoices are more commonly found in the commercial sector, where the processing of purchase invoices is a time-consuming process due to the high number of lines.

In this chapter, we examine the potential logics for public sector intervention.

General intervention logic

Two main principal approaches can be distinguished when it comes to the intervention logics supporting the transition to e-invoices:

- ▶ **Regulative intervention logic**

One of the options in the case of the regulative intervention logic would be to establish by regulations the right of the buyer to request the seller to issue the sales invoices as an e-invoice. Having selected an e-invoice operator in the e-Business Register may be interpreted as having made this request. In this case, the seller would be required to check through their business software the buyer's preparedness to accept e-invoices (which is enabled by several business software applications) in the case of a sales transaction and, if such preparedness is identified, the invoice would be issued as an e-invoice by default.

- ▶ **Supporting intervention logic**

In the case of the supporting (and motivating) intervention logic, the transition to e-invoices would be supported by various different measures without establishing a strict obligation to use e-invoices.

Even though some parties interested in a wider use of e-invoices mentioned the possibility of making e-invoices mandatory in the study (regulative intervention logic), this option was not widely supported. The majority of the parties believed that the invoicing between two businesses should be part of the mutual agreements between those businesses and regulation thereof would constitute excessive intervention of the freedom to conduct a business.

When choosing the intervention logic for the e-invoicing market, the presence of any signs of market barriers in the current situation should be assessed. As there is a market of service providers in the form of business software and operator service providers when it comes to e-invoices, the transition to e-invoices is not prevented from this perspective. Another thing to consider is whether it might be a case of so-called 'Pareto inefficiency' with the business sector as a whole using e-invoicing at a relatively low extent but spending an unreasonable amount of resources on the invoicing processes. This would primarily apply to the processes of processing purchase invoices which would provide significant time-savings in the case of switching to e-invoices. As the transition to e-invoices would be more beneficial to buyers compared to sellers (due to the fact that processing PDF purchase invoices is more time-consuming, but there is no significant difference when it comes to issuing invoices), there is reason to believe that the entire system would be more efficient in the event of a wider use of e-invoices. This does not necessarily apply to all businesses sending and receiving e-invoices in a limited extent, though, and for them, the switch to e-invoicing would be associated with costs that they do not deem reasonable.

Based on the above, it can be said that even though the switch to e-invoices will probably increase the efficiency of the entire invoicing system, there is no classic market barrier present here, which is known in the case of other public goods (incl. healthcare, national defence, public roads, etc.).

Based on the above and on the weighted assessments of the parties involved in the study, it would be reasonable to implement the supporting intervention logic by taking different approaches in the case of different target groups. We discuss this in detail below.

Businesses

From the perspective of businesses, the transition to e-invoices is mainly prevented by a lack of awareness of directly motivating factors, especially among small enterprises. Thus, businesses, especially the key personnel involved in financial processes should be notified better of the potential uses of e-invoices and the accompanying benefits and impacts. It is also necessary to alleviate the fears of the processes of the business becoming less comprehensible with the switch to e-invoicing or the use of e-invoices being accompanied by more control from the state. The prejudice of the transition to e-invoicing being excessively complicated must also be alleviated.

As invoicing processes mainly concern accountants and financial specialists and SMEs widely use the services of accounting bureaus, it would be reasonable to focus on accountants and the businesses providing accounting services in the activities designed to raise awareness.

In the case of businesses, the switch to e-invoicing is not always limited to activating e-invoices in their business software and signing a contract with an operator. In the case of several mutually interfaced information systems, further developments in other information systems may also be required. We would advise offering support to businesses in developing their accounting processes and systems for this purpose, if necessary, which would also support the transition to e-invoicing.

Business software providers

Most commonly used business software applications already support processing e-invoices and the providers of those applications promote this among their clients. As business software providers mainly develop their products based on the needs of their clients, incl. accountants, mutual cooperation is important, with both parties working in the name of making the transition to e-invoicing and the use of e-invoices as convenient as possible. For this purpose, the functionality of activating e-invoices should be made as simple as possible, making it a default setting, if possible (which is already the case in the case of some business software applications).

As there are plans to start implementing the EU e-invoice standard in the near future and the switch to the new standard will require some software developments, the study revealed the need to give business software providers an opportunity to apply for support for those developments.

Accounting service providers

Accountants and accounting service providers are a large and important target group that has an impact on the invoicing practice. They are connected by the Estonian Assembly of Accountants, through which it is possible to communicate targeted information to this potential target group of e-invoices.

We would advise to organise awareness-raising activities on the topic of e-invoicing in the field of accounting and finance through the representative organisation or other initiatives.

E-invoice operators

E-invoice operators see a lot of potential and have a business interest in a wider use of e-invoices, as further transition to e-invoicing will increase their turnover, which will in turn allow them to make developments to improve the services. On the other hand, an increase in the volume of e-invoices will enable to lower service fees in the future, as the cost of the infrastructure required to provide the operator service will not increase proportionally with the increase in the volume of e-invoices.

Table 4. The intervention measures of the parties to the e-invoicing ecosystem by type

Party	Support
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	Technical	Awareness	Financial
Undertakings			
Undertakings	Support for the development of the accounting processes and systems of the business	Trainings, information materials, and awareness raising on the benefits of and transition to e-invoices	Financial support may be need for making the systems of a business interoperable of switching to another ERP
	Trainings and guidelines on the switch to e-invoices and for improving IT literacy		Continuing to ensure the possibility to send a low volume of e-invoices
Accountants	Trainings and guidelines on the switch to e-invoices and for improving IT literacy	Trainings and overviews of the wider benefits of e-invoices for accountants	No direct need for financial support
Business software developers	Making the developments in the business software required for the switch to the EU e-invoice standard Drawing up a standard and instructions for generating invoices to prevent issues in the processing of invoices Aligning the logics of the user interfaces of different business software applications based on feedback from users Making sending e-invoices a default setting in business software applications		The need for support depends on the number of hours required for development and on the pricing policy thereof

Source: EY, 2021.

Based on the information collected in the course of interviews and focus groups and based on analysing the experiences of foreign countries, it may be concluded that a wider use of e-invoices in the private sector would be relatively easy to promote by establishing the obligation to issue e-invoices based on the requests of the recipient. This solution is used in Finland, for example, and has provided positive results when it comes to increasing the volume of e-invoices in the private sector. The analysis and the information collected from market participants did reveal, however, that it is not reasonable to enforce such obligations before the state has ordered an in-depth analysis, mapping the potential risks, expenses, and issues that may arise for different parties. Furthermore, the current text of the Accounting Act already enables private undertakings to request e-invoices.

It was also suggested in the course of the analysis that the state could consider providing a central gateway service based on the already existing e-invoice adapter of e-arveldaja, which would enable all business software developers to only interface their software application with **one** e-invoice operator, which would mean the lowest possible cost for the parties if the service was supported from state budget.

Developing this solution would not be resource-intensive for the state and it could be executed relatively easily and quickly. The solution described would enable making the technical process of e-invoicing simpler and cheaper for the market participants, which would in turn allow business software developers to offer more convenient use of e-invoices to businesses. A more realistic solution would be switching over to the Peppol network with the transition to the EU e-invoice standard, which allows different e-invoice operators offering a wider selection of different services to different target groups to operate in the market.

The support measures developed and provided by the state should be accurately targeted and using a support measure should come with an obligation to check targeted use of the measure at a later date to assess fair use of the support measure and its compliance with the need of different parties and to prevent any potential abuse of the support. Therefore, it should be possible for the state to restructure support measures or plan new measures for the measures to be suitable for different parties and cover the expenses arising from the activities ensuring a wider use of e-invoices.

The user convenience of the e-invoicing applications (preferring e-invoices by default, automatic selection of channels, automatic checks of the capability to receive e-invoices specified in the e-Business Register, further automatic functions in drawing up accounting entries arising from the possibilities provided by e-invoices, taking into consideration the possibilities for data-based reporting based on the data composition of an e-invoice, etc.) from the perspective of the end customer (the business and its accountant/accounting service provider) and positive awareness raising activities (practical guidelines for switching to e-invoicing, trainings for accountants/accounting service providers, e-invoice campaigns for businesses) are the support measures that the state should focus on first. Wider awareness rising and campaigns should be used to explain the positive impact of e-invoices on businesses and uniform solutions and standards should be provided which should enable businesses to send e-invoices by just one click.

3.5 EN 16931 standard in Estonia

Estonia has currently been using one e-invoice standard for more than ten years and it is used by the entire current e-invoicing system with the supporting infrastructure and, thanks to the relatively long practice, all related parties are familiar with this. Speaking about the EU e-invoice standard, it is important to assess whether the currently preferred Estonian e-invoice standard should be eliminated, switching to the EU e-invoice standard, and whether that would ensure all needs and possibilities that have been mapped now and may arise in the future for Estonia. We discuss this in detail in the following sub-chapter.

According to the ITL and RTK, the current Estonian e-invoice standard is satisfactory, but different issues were also highlighted and they could be solved by switching to the EU e-invoice standard in Estonia. The ITL has made some preparations for transferring to the EU e-invoice standard (see the following sub-chapter), but support would be needed for drawing up an in-depth scenario analysis and there is no such initiative from the different market participants at this point. The RKT believes that a full switch to the EU e-invoice standard would also not be reasonable, but the Estonian own e-invoice standard could remain in use in domestic roaming and the proven and well-functioning EU e-invoice standard and a data exchange network, such as Peppol, could be used for international roaming.

The current Estonian e-invoice standard may, however, become an issue in the near future, as it is outdated from the technical perspective and it is pointless to create new developments or extensions on the basis of the standard. It would make more sense to take over the EN 16931 EU e-invoice standard and its syntaxes UBL or CII which would also be a better match for the solutions to be created based on the concept of real-time economy. In any case, the EU e-invoice standard will make it easier to send e-invoices to foreign countries, to receive them from abroad, and to participate in the European single digital market.

The current Estonian e-invoice standard has shortcomings that prevent commercial enterprises from drawing up sufficiently detailed e-invoices (they prefer using EDI systems provided by Telema, Edisoft, etc.).

Transition to the EU e-invoice standard would help solve the problems currently caused by the restrictions arising from the Estonian e-invoice standard. The problem highlighted is due to the fact that the data composition of the standard currently used in Estonia is not extensive enough for providing all the details required in invoices, keeping in mind different fields of activity. The current Estonian e-invoice standard includes twelve mandatory data fields and is lacking in-depth validation used in the EU e-invoice standard and ensuring a considerably higher data quality compared to the Estonian e-invoice standard thanks to the classifiers used in the data fields. It is currently possible to add various different extensions to the Estonian standard, but those are not used widely in practice and are burdensome for the parties to develop. For example, the issue of specifying the VAT identifier in invoices is currently problematic and the requirements applicable to commercial enterprises do not allow for specifying the information required in sufficient detail, for example by product groups.

Transition to the EU e-invoice standard would also help solve the issues arising from using different business software applications and interfaces within one company (such as large production or wholesale and retail undertakings), which prevents them from issuing compliant e-invoices, for example, as it is not enabled by the Estonian e-invoice standard. The EU e-invoice standard would enable properly providing the respective information in an e-invoice, as well as to enclose and documents required (such as customs documents, excise documents, product descriptions, etc.).

For example, one retail chain highlighted that the EU e-invoice standard is a functioning and proven solution that could be uniformly transposed and implemented in Estonia.

According to the parties involved, there is currently no direct compulsion or need for the transition to the EU e-invoice standard, as there is no critical mass of businesses needing or requesting it and different parties are not prepared to cover the costs of switching to the standard alone. On the other hand, the relatively modest spread of e-invoices provides a good opportunity to complete the switch to the EU e-invoice standard as soon as possible, as it would not concern all businesses and we would already be using the new standard by the time of reaching mass use of e-invoices. The afore-mentioned connection is also important for the alignment of different real time economy solutions, e.g. the 'Aruandlus 3.0' project for submitting accounting entry-based reports initiated by the public sector. On the side of the private sector, the MyCompanyData Service application has been created as a common development project of Estonian business software developers and e-invoice operators and it allows converting accounting entries into EU e-invoices and vice versa and is linked to the Peppol network.

The transition to the EU e-invoice standard should involve almost all parties involved in sending and receiving e-invoices, from businesses and accountants to business software developers and e-invoice operators. Different parties require support in different extents.

Based on the assessments of the project team and the market participants, one of the options could involve some of the market participants (ERP, operators, accountants) voluntarily switching to the EU e-invoice standard within the framework of a project and assessing and mapping the entire process – time, resources used, problems which may arise, and need for support.

This approach would allow the future scenario to better model and design the support measures from the state so that they would be best-suited for different parties. The approach would also enable assessing the need for the EU e-invoice standard and the preparedness and demand of businesses.

Alternatively, the state can simply make the EU e-invoice standard mandatory without prior analysis, as all different parties involved in the e-invoicing process from all over Europe have taken part in the development of the EU e-invoice standard and a number of functioning solutions have been developed and validated by the parties, making the EU e-invoice standard practically universal.

Financial cost

The transition to the EU e-invoice standard would not be accompanied by direct financial expenses for businesses, but the expenses on the developments of business software and operators may be indirectly transferred to businesses in the form of service fees. The use of the EU e-invoice standard may also come with a time cost for businesses due to the increase in the volume and accuracy of the data entry process required for automatic generation of different reports (incl. sustainability reports). The requirements for the accuracy of invoicing may, however, also become more stringent for other reasons, for example if the obligation to submit sustainability reports is established (in connection with ESG); thereat, a more detailed e-invoice containing better data may be a good input in making sustainability reporting accounting entry-based.

Business software developers would need most support in the case of the transition to the EU e-invoice standard, as they would be required to make changes in their software for switching to the new standard and the related developments. Based on the analysis of the need for support conducted by the project team, the estimated cost for business software developers would amount to approx. 30,000–50,000 euros.

The costs of additional developments related to the internal systems of a company may be added to the aforementioned estimated amount for certain businesses (such as large production companies), and the extent of such costs would depend on the level of complexity of the existing system, potentially amounting to up to 100,000 euros in the case of large businesses. The specific amount depends on the volume of the work performed and the technical capability and competence of the business software developer. In the case of smaller businesses, switching to the EU e-invoice standard may require a considerable amount of time and resources that must be found at the expense of the daily work of the business. This support could be connected to an existing support granted by Enterprise Estonia for the digitalisation of businesses at the national level.

For the operators, the transition to the EU e-invoice standard would come with a relatively low financial cost, as the services of large operators already support the EU e-invoice standard since subscribing to the Peppol network.

Different parties believe that the transition period could last twelve months, on average, and the transition should not be abrupt, but a buffer period would be needed, during which it would be possible to use the EU as well as the Estonian e-invoice standard.

Risks and advantages

One of the risks of the implementation of the EU e-invoice standard for businesses might be the stricter requirements for entering the data of sales invoices and filling in the mandatory fields.

On the side of advantages, however, the EU e-invoice standard allows for drawing up more accurate e-invoices and the option to enclose required documents to invoices is added. The transition to the EU e-invoice standard and subscribing to the Peppol network commonly used in Europe will also increase the competitiveness of businesses, as it will make it easier to access a single functioning market, the businesses will be able to take part in cross-border public procurements, and they will also become more reliable for foreign partners.

There are also no direct risks from the perspective of accounting service providers, while a decrease in the amount of extra work which is currently done in the case of specific invoices due to the restrictions arising from the Estonian e-invoice standard could be highlighted as an advantage. This would mean an additional time resource for accounting service providers which would enable providing services to a wider circle of clients.

In the side of business software developers and operators, the risks would be limited to potential unforeseeable development operations and costs associated with the transition to the EU e-invoice standard.

In the course of the study, the parties found that it would be reasonable to start making preparation for the transition to the EU e-invoice standard and develop guidelines and restrictions for the implementation of the standard (CIUS) which would take into consideration different e-invoice usage cases. During the transition period, only the Peppol BIS (Business Interoperability Specifications) requirements²⁸ may also be used.

3.5.1 EN 16931 – the EU e-invoice standard in Estonia: strengths and weaknesses

Estonia has already made preparations and taken steps for foregoing the local e-invoice standard and to start using e-invoices drawn up based on the e-invoice standard EN 16931 developed within the framework of EU directive 2014/55/EU. Two syntaxes can be used to submit invoices which are based on the semantic model of EN 16931: OASIS UBL 2.1 XML and UN/CEFACT XML Cross Industry Invoice, D16B, also known as CII. UBL is more commonly used of the two syntaxes.

Here, it is important to stress the following:

²⁸ <http://peppol.eu/what-is-peppol/peppol-profiles-specifications/>.

- ▶ In 2018, a project was conducted in the ICT cluster of the ITL to analyse the translation of an EN 16931-based EU e-invoice into the Estonian e-invoice format and vice versa. Initial advice for the use was drawn up and published in the form of documents (<https://itl.ee/e-arve-kirjeldus/>).
- ▶ In the spring of 2021, the ITL also submitted an official inquiry to the Ministry of Finance with an aim of drawing attention to the fact of the development of the Estonian e-invoice format having halted, with the last updated made in 2012. Therefore, the format is no longer deemed sustainable and updating the format is also not considered reasonable. There is a clear direction and advice for switching to the internationally acknowledged e-invoice format EN 16931.

It is important to highlight that EN 16931 determines the description and definition of an e-invoice in the UBL and CII syntaxes but does not establish any requirements for the transporting of e-invoices. This is a common feature with the current Estonian e-invoice standard, but in the case of the local format, it is obvious that the roaming network built between the operators is based on bilateral agreements which has given rise to a multitude of technologies. The Estonian e-invoice XML files are sent via SOAP (Simple Object Access Protocol) and REST APIs by using FTP (File Transfer Protocol) file transfer. All operators have their own preferences and technical documentation. Thereat, the versions of the Estonian e-invoices used may also vary in certain cases (1.0, 1.1, 1.2 and 1.11 in some cases). The strength is the central register of the businesses which receive e-invoices available in the e-Business Register. The registry code of a legal person is the local address for sending e-invoices.

Thus, both advantages and disadvantages may be highlighted, but the following are the most important aspects which must be focussed on:

1. Sustainability of the format
2. Restrictions applying to the format and the quality of the data
3. Domestic scope of use

EN 16931 is significantly stronger than the local format in all of the afore-mentioned aspects. Furthermore, it is important to highlight that only the syntax of the invoice (the XML elements which are validated by using and XSD file – the XML Schema Definition) and the data formats included in the invoice (text, number, data, field length) has been defined in the case of the Estonian local format, but there are no comprehensive rules for assessing the compliance of the content of the fields (mathematical accuracy of the amounts, properly coded references, etc.). The rules have been partly defined in the description of the Estonian e-invoice in the text format, but no technical validation of the content has been developed.

In the case of EN 16931, there is unambiguous documentation (description of the content, translation between UBL and CII, user instructions, code tables) as well as all tools required for validation²⁹. Attempts have been made to minimise the possibilities for different interpretations. Documentation with explanations is available in the standard version³⁰ as well as in the form of an online catalogue³¹. Official validation tools are also publicly available³².

²⁹ <https://ec.europa.eu/cefdigital/wiki/download/attachments/106234259/en16931-ubl-1.3.6.zip?version=1&modificationDate=1623692924964&api=v2>

³⁰ https://standards.cenelec.eu/dyn/www/f?p=205:32:0::::FSP_ORG_ID,FSP_LANG_ID:1883209,25&cs=18F2559A05E966F8D6BA2CD11622D2977

³¹ <https://docs.peppol.eu/poacc/billing/3.0/>

³² [Registry of supporting artefacts to implement EN16931 \(europa.eu\)](https://ec.europa.eu/eurofiscalsupport/registry-of-supporting-artefacts-to-implement-en16931/)

The main parties responsible for the development of EN 16931 are the European Committee for Standardisation (CEN), the European Committee for Electrotechnical Standardization (CENELEC)³³, and the CEN Technical Committee CEN/TC 434 on Electronic Invoicing³⁴. The following parties also contribute to the development of the standard:

- ▶ OpenPeppol³⁵ - Open Pan-European Public Procurement On-Line Association³⁶
An association with almost 500 members from both public and private sectors. The focus is especially on the public sector.
- ▶ EESPA³⁷ - European E-Invoicing Service Providers Association
Consists of less than 100 businesses and is a professional organisation which represents the interests of service providers.

Restriction of the number of potential interpretation and constant work on specifying the standard have built a strong foundation for extensive use of EN 16931.

In addition to defining the content and format of an e-invoice, the developments for transporting e-invoices have also been focussed on. A uniform format is of little use if the partners are unable to dispatch and receive the e-invoices comfortably and obtain information about who and where are prepared to accept e-invoices (incl. cross-border recipients).

The EN 16931 e-invoices can also be sent by applying alternative measures – even by adjusting the current Estonian e-invoice roaming network (by updating the API interfaces), although it would be considerably more reasonable to switch to the Peppol network. This one common global e-invoicing network that is already used in more than 30 countries on the same grounds enables sending e-invoices to almost 500,000 businesses and agencies. A public register is used where the interested party must simply register for the receipt of e-invoices. For sending e-invoices, simply access to the transfer application or access point is enough, which is usually ensured by the e-invoice operator. The recipient of the e-invoice specifies their format preferences in the Peppol network and the sender must ensure that the criteria established by the recipient are met. In the Estonian conditions, it would be advisable to use EN 16931 UBL BIS3 (also referred to as 'Peppol BIS Billing UBL Invoice V3').

The main parts of the Peppol network include the following (see also Figure 7):

- ▶ SML – Service Metadata Locator – a central server that helps find the locations of the addressee of the e-invoice
- ▶ SMP – Service Metadata Provider – recipients of e-invoices, the service provider's address book
- ▶ AP – Access Point – the application used to send and receive e-invoices

³³ <https://www.cencenelec.eu/european-standardization/cen-and-cenelec/>

³⁴ https://standards.cenelec.eu/dyn/www/f?p=205:7:0:::FSP_ORG_ID:1883209&cs=1FB866C0AE6E1605133D6363716BED68E

³⁵ <https://peppol.eu/about-openpeppol/>

³⁶ <https://peppol.eu/about-openpeppol/history-of-openpeppol/>

³⁷ <https://eespa.eu/>

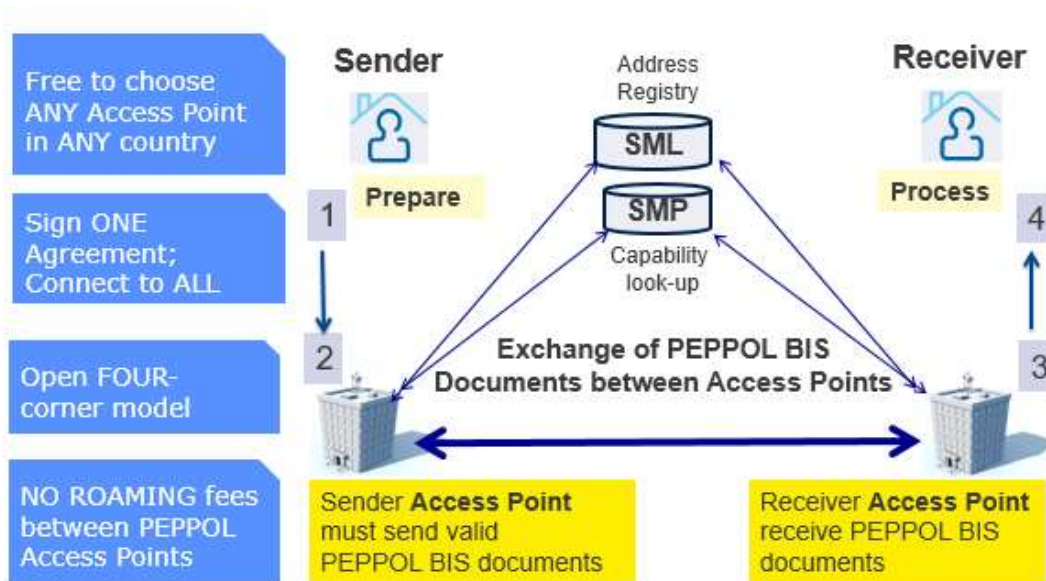


Figure 7. The architecture of Peppol³⁸

Due to the accessibility of Peppol, it would be advisable to consider using the secure and reliable transfer method of Peppol AS4 for transporting e-invoices in the case of the local e-invoice roaming in Estonia. The network does not restrict the use of e-invoices based on segments. B2B, B2G, and G2G e-invoices can all be used.

It is also important to point out that large international business software applications used by many Estonian businesses and agencies already come with the Peppol transfer and EN 16931 support integrated.

The transparency and added values of EN 16931:

- ▶ In the case of the e-invoices transferred in the Peppol network, it is possible to use responses in the Invoice Response Message³⁹ (IRM) format. This enables the recipient of the invoice to also provide information about approving, cancelling, or paying the invoice, etc. to their supplier, in addition to the simple 'I received the invoice' message. The responses are uniformly coded and thereby always comprehensible.
- ▶ The EN 16931 format defines clearly and unambiguously the possibilities for enclosing documents to invoices. This solves the issue of sending delivery notes, reports, and other additional information.
- ▶ Coding of values and implementation of the codes. A great value in increasing the quality of Estonian e-invoices and facilitating the process of making information machine-readable (incl. suitable for automation). The standard uses standardised codes from addresses to the units of products/services. Anyone interested can download them⁴⁰ and use them in their software.

3.5.2 EN 16931 – the EU e-invoice in Estonia: CIUS

The e-invoices generated based on EN 16931 use the term CIUS – *Core Invoice Usage Specification*. This enables establishing additional country-specific or, if necessary, sector-specific requirements for standard e-invoices. For

³⁸ <https://peppol.eu/what-is-peppol/peppol-transport-infrastructure/>

³⁹ <https://docs.peppol.eu/poacc/upgrade-3/profiles/63-invoiceresponse/>

⁴⁰ <https://ec.europa.eu/cefdigital/wiki/download/attachments/106234259/EN16931%20code%20lists%20values%20v8%20-%20used%20from%202021-09-06.xlsx?version=1&modificationDate=1631534504555&api=v2>

this purpose, it is possible to define the usage cases of e-invoices (compliance with the XML syntax) or make some elements of an e-invoice mandatory. CIUS does not enable adding new XML elements.

Estonia has not yet conducted an in-depth analysis of the needs for CIUS but, based on experience, the authors of this study would advise to initially stick to the widely acknowledged and common use of CIUS – Peppol BIS 3⁴¹.

It would be advisable to first implement the afore-mentioned CIUS and start issuing invoices in this format and make decisions on the next steps in the development of CIUS after the end of the pilot period. Analysing the experience of different countries shows that the need for CIUS usually arises from the requirements to declare taxes.

The transition to the EU e-invoice standard with the CIUS developed would potentially help solve those problems for businesses that arise from the weaknesses of current e-invoice standard – such as the issues with rounding, the lack of value added tax on the invoice lines or different rates of the tax, and other issues related to generating incomplete invoices. Those examples mean that both the accounting service providers and the businesses must check the e-invoices generated in the case of using the Estonian e-invoice standard and fix any errors manually, which means that the potential financial and time savings arising from using e-invoices compared to PDF invoices is not significant.

The EU e-invoice and its syntaxes create the prerequisites required for minimising these issues.

3.5.3 EN 16931 – an example from Sweden to support the transition to the EU e-invoice standard

Sweden is a good example among our neighbouring countries, as the local roaming network there is being gradually closed and is going to be fully replaced with components based on the EN 16931 standard from the perspective of the e-invoice format as well as transporting e-invoices. As of April 2021, it is no longer advisable to use Svefaktura version 1 (based on the UBL 1.0 syntax) or the Fulltextfaktura formats (based on the EDIFACT D96A format). The only format which is currently recommended is EN 16931 and its CIUS Peppol BIS Billing 3.

In addition to the harmonisation of the transport and format, the state is contributing actively as the official and Peppol Authority and by taking part in the activities of OpenPeppol. Thereby, Sweden has the opportunity to steer in the development of the EU e-invoice standard via discussions. The latter together with the local legislation has ensured that Sweden has no need for contributing into developing their own national CIUS or analysing the need for it.

Estonian legislation is very similar to the Swedish one with respect to tax returns as well as invoice management: both countries are using the so-called post-audit model in tax accounting. Thus, the authors of this study would advise Estonia to replicate the Swedish model and take the steps required for establishing EN 16931 and its CIUS Peppol BIS Billing 3 as the local standard.

⁴¹ <https://docs.peppol.eu/poacc/billing/3.0/bis/>

4. Analysis of foreign countries

The aim of the analysis of foreign countries was to obtain an overview of the practice of using e-invoices in other countries, incl. the mandatory nature, operating logics, regulative side, formats, respective authorities, etc. The study involved analysing the e-invoicing ecosystems of Denmark, Sweden, and Finland.

Those representatives of foreign countries who were contacted by the research team to collect information about the experience of a wider use of e-invoices and solving problems did not refer to any specific activities or give any advice on what would be essential to implement to increase the volume of B2B e-invoices in the Estonian context. The main measure advised by the representatives of all foreign countries involved was clear and unambiguous communication, mainly addressed to businesses.

The table below provides a brief overview of the outcomes of the analysis of foreign countries concerning the mandatory nature of e-invoices, the logic of the e-invoicing process, and the formats used.

Table 5. Summary of the practice of using e-invoices in foreign countries

	Finland	Sweden	Denmark
Mandatory nature of e-invoices			
B2B	The businesses with the annual turnover of over 10,000 euros are entitled to request e-invoices. An estimated 80% of all B2B invoices are e-invoices.	Voluntary. DIGG does not collect information about the volumes of B2B/B2C.	Voluntary. DBA does not collect information about the volumes of B2B/B2C.
B2G	As of 1 April 2019, all public sector entities are obligated to accept e-invoices, including those which are compliant with the EU e-invoice standard or the Finvoice 3.0 standard.	In Sweden, as of 1 April 2019, all public sector entities are obligated to accept e-invoices, including those which are compliant with the EU e-invoice standard or the Peppol BIS Billing 3.0 standard. All supplies are also required to submit e-invoices to the public sector.	As of 18 April 2019, all public sector entities are obligated to accept e-invoices, including those that are compliant with the EU e-invoice standard; the NemHandel e-invoicing platform must be used for this purpose.
Mandatory formats	B2G – formats which are compliant with TEAPPSXML 3.0 / Finvoice 3.0 / EN 16931-1 B2B – no specific requirements	B2G – Peppol Billing 3.0 / other formats compliant with EN 16931 B2B – no specific requirements	B2G – Peppol Billing 3.0 / OIOUBL 2.0 B2B – no specific requirements
Logic of sending and receiving e-invoices	The square model in the case of B2B as well as B2G	Different models for B2B and B2G	Different models for B2B and B2G

Source: EY, 2021.

4.1 Denmark

In Denmark, as of 18 April 2019, all public sector entities must accept the e-invoices that are compliant with the EU e-invoice standard. The Danish Business Authority is the authority responsible for the e-invoicing programme and is in charge for monitoring the aspects related to the e-invoicing infrastructure and steering and developing the standards and different technical solutions.

Below, we list the e-invoice standards used in Denmark and provide an overview of the e-invoicing infrastructure with descriptions of the processes of sending and receiving B2B and B2G invoices.

Responsible authority	Erhvervsministeriet	
Legislation	<ul style="list-style-type: none"> ▶ Law on use of electronic invoice no 1593 of 18/12/2018 ▶ Consolidation Law on public payments, etc. Act. No.798 of 02.28.2007 ▶ Order on electronic settlement with public administrations, Order No. 206 of 11.03.2011 ▶ Order on Information and transport of OIOUBL electronic invoice used for electronic settlement with public authorities, Order No. 354 of 03.26.2010 ▶ Directive 2014/55/EU transposed 	
The status of e-invoices	<ul style="list-style-type: none"> ▶ Both Danish or foreign suppliers must submit e-invoices to the public sector and the public sector may only accept e-invoices. ▶ E-orders/e-catalogues will be mandatory as of January 2023 	
The mandatory nature of e-invoices	B2G: mandatory to accept; B2B: voluntary	
The model of e-invoices	B2G: centralised ; B2B: post-audit	
The definition of e-invoice	An invoice which is issued, transmitted, and received in a structured electronic format that enables automatic and electronic processing of the invoice. E-invoices include both purchase and sales invoices, as well as credit invoices.	
The extent of the mandatory nature of e-invoices	<p>The mandatory nature of sending e-invoices:</p> <ul style="list-style-type: none"> ▶ Mandatory for all Danish suppliers if the invoice is submitted to a public sector entity. ▶ Mandatory for foreign suppliers if the invoice is submitted to a public sector entity. In this case, however, it is permitted to submit invoices that are not in the format of the invoices submitted by Danish suppliers. ▶ Mandatory for the public sector entities and agencies in certain areas of activity*; also, as of January 2023, it will become mandatory to conduct the public procurements in certain sectors that have not yet been specified in the e-catalogue and e-ordering environment. <p>The mandatory nature of accepting and processing e-invoices:</p> <ul style="list-style-type: none"> ▶ As of 18 April 2019, all public sector entities must accept the e-invoices that are compliant with the EU e-invoice standard EN 16931. ▶ As of 18 April 2020, all public sector entities must subscribe to the Peppol infrastructure and register as users of NHR. ▶ The mandatory nature of e-invoices does not extend to the Faeroe Islands and Greenland. 	
	B2G	B2B
The mandatory document formats for exchanging invoices with the public sector and/or between transaction partners	Peppol BIS BILLING 3.0 Peppol BIS 3.0 for the e-ordering and e-catalogue	No specific requirements
Other document formats used between transaction partners	OIOUBL (the national UBL 2.0 standard)	PDF, OIOUBL, Peppol BIS
The mandatory platforms that must be subscribed to for exchanging e-invoices	Peppol Nemhandel	No specific requirements
Other platforms that can be used for sending e-invoices	Virk.dk – the online environment created by the Danish Business Authority, which can be accessed free of charge by those private businesses that are required to send e-invoices to public sector entities	Nemhandel

* Not specified.

Communication	Nemhandel	Peppol
Automatic	Automatic information exchange is permitted if the service provider or ERP is connected to Nemhandel.	All public sector entities are connected to the Peppol network for receiving invoices.

Manual	Nemhandel does not have its own online portal in which invoices could be entered manually, but the Danish Business Authority has created an online environment that is integrated to verk-dk and can be used by businesses for sending e-invoices to the public sector. It is not permitted to send invoices by e-mail.	Public sector entities do not provide suppliers the option to send manually entered invoices. Suppliers can, however, use the services of Peppol to draw up invoices manually or electronically and transfer them via Peppol.
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Legislation

Pursuant to the law, all natural and legal person must have a NemKonto account to receive payments from the state; no other payment options are prescribed by the law. General provisions have been established, for example, concerning information about the invoices issued by public sector entities to legal and natural persons, the use of infrastructure, etc.⁴² The law also prescribes that the OIOUBL standard managed by the Danish Business Authority (DBA) must be used in the case of public procurement procedures. Furthermore, it has been established that public sector entities should use the OIO Reliable Asynchronous Secure Profile (OIORASP) of the standard of online services. This enables exchanging documents (such as e-invoices) over the internet ensuring a high level of security and reliability.

Logic of sending and receiving e-invoices

Denmark monitors and manages the use of the future EU e-invoice standard (UBL), transmission of e-invoices via online services (in compliance with OIORASP), and the use of the Danish national infrastructure (NemHandel). Only the parties accepting e-invoices must register in the NemHandelRegistry (NHR) to obtain an e-invoice recipient number (GLN/EAN number). All public sector entities have at least one e-invoice recipient number published on the website of the organisation.

Process of sending B2G e-invoices

- ▶ The supplier sends the invoice to the service provider forwarding e-invoices (SSP).
- ▶ SSP sends the final e-invoice to Nemhandel/Peppol in the previously legally agreed format (OIOUBL or Peppol BIS) by using different protocols (AS4 or OIORASP).
- ▶ The NemHandel platform forwards the technical confirmation to the e-mail address of the sender or to another channel specified by the supplier.
- ▶ The vendor receives the e-document from the mandatory Nemhandel/Peppol environment in a structured format.

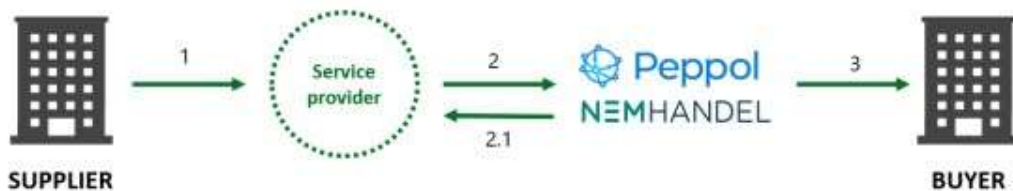


Figure 8. The Danish e-invoicing infrastructure and the logic of using e-invoices. Source: Pagero, 2021.

Process of receiving B2G e-invoices

⁴² Order on electronic settlement with public authorities, Order No. 206 of 11.03.2011

The public and private sector entities which accept e-invoices must be registered in NemHandelRegistry (NHR) and thereby have an e-invoice recipient number (EAN number). All public sector entities must have at least one EAN number. As of 18 April 2020, all public sector agencies must use the Peppol network and be registered as e-invoice recipients at the NHR.

Process of sending B2B e-invoices

The process of sending and receiving B2B e-invoices is not uniformly regulated. Transaction partners can choose between several methods, formats, and service providers, which determine the final format of the e-invoice. Suppliers can use Nemhandelit for checking whether their customers 'behind' NemHandel accept e-invoices and in which format. The effect of the extensive use of the Peppol network in the public sector has been carried over to the private sector, as many private businesses are increasingly using Peppol for receiving e-invoices.

Businesses can use one of the three main tools to issue e-invoices:

- ▶ The enterprise resource planning (ERP) solutions (software or Internet-based) of the business with fully integrated e-invoice support
- ▶ The ERP solutions with an open-source software provided by DBA – the message processing client of NemHandel
- ▶ Manually in Internet-based invoicing portals (the online form)

Process of receiving B2B e-invoices

Private undertakings can receive e-invoices through the Nemhandel environment. For this purpose, the undertaking must be registered in the NHR and have an e-invoice recipient number, which may be a CVR number or a SE number. Private businesses can also purchase EAN numbers if the business has several departments which must be capable of receiving and sending e-invoices separately.

Businesses can freely select their preferred method of receiving an e-invoice and can also buy this service from different service providers that meet their needs.

Volume of the market of e-invoices

No detailed list has been drawn up of the service providers providing e-invoice solutions operating in Denmark.⁴³ According to the European Commission, there are over one hundred such service providers.⁴⁴ Peppol has 327 clients which have registered with Peppol as e-invoice solution providers. The state does not monitor the use of e-invoices in the private sector in Denmark and the e-invoice operators are not required to collect statistical data about the volume of e-invoices.

In July 2021, NHR had 74,783 users (58,138 public sector entities, 16,010 legal persons, 635 other persons) and Peppol had 41,103 users (41,074 public sector entities, 29 legal persons).

The DBA has an overview of the public sector entities that accept e-invoices, as all public sector entities are required to register in the national SMP, and of those private businesses that are using a state-owned platform for receiving e-invoices. The DBA does not have an overview of the clients of Peppol, as the private sector is not under any legal obligation to collect such data, they do not have the technical capability required for this, and they are not required to notify the DBA of new clients.

The situation will change when OpenPeppol will publish its new reporting procedure, which will involve collecting statistical data based on the details of the end user.

The Danish national standard is very similar to the Peppol standard and thus the majority of the e-invoice recipients who are registered as entities accepting e-invoices in the Danish national format can conclude an agreement

⁴³ The response from the DBA to an inquiry by EY

⁴⁴ <https://ec.europa.eu/cefdigital/wiki/display/CEFDIGITAL/eInvoicing+in+Denmark>

with their IT service provider which will enable them to also receive and send Peppol documents. It should, however, be noted that such agreements are generally concluded separately, not automatically, as the direct benefits are minimal for those businesses which are not involved in foreign trade. Thus, the statistical data of Peppol probably reduces the de facto capability of e-invoice recipients to some extent.

Main challenges in the implementation of the e-invoicing system in the private sector

According to the DBA, the main challenge faced in Denmark is proving the benefits arising from using e-invoices to the private sector.⁴⁵ The infrastructure developed to cut the expenses of the public sector may not necessarily mean direct saving of resources (time, money) for the private sector. The EU regulation in which the EU VAT directive enables defining an invoice in a quite generalised manner and does not prevent the Member States from restricting B2B invoices only to e-invoices in certain formats does not help.

4.2 Sweden

In Sweden, as of 1 April 2019, all public sector entities are obligated to accept e-invoices, including those which are compliant with the EU e-invoice standard or the Peppol BIS Billing 3.0 standard. The authority responsible for the e-invoicing programme is the Swedish Agency for Digital Government (DIGG) with the Ministry of Finance and the tax authority that monitor the issues related to the e-invoicing infrastructure and are in charge for the steering and development of standards and different technical solutions.

Below, we list the e-invoice standards used in Sweden and provide an overview of the e-invoicing infrastructure with descriptions of the processes of sending and receiving B2B and B2G invoices.

Responsible authority	<ul style="list-style-type: none"> ▶ Myndigheten för digital förvaltning (DIGG) ▶ Ministry of Finance ▶ Tax Authority
Legislation	<ul style="list-style-type: none"> ▶ The E-invoice Act (2018:1277) ▶ The Public Procurement Act LOU (2016:1145) ▶ The Accounting Regulation (2000:606)
The status of e-invoices	E-invoices are only mandatory for public sector entities.
The mandatory nature of e-invoices	B2G: mandatory to accept (preferably Peppol); B2B: voluntary (post-audit)
The model of e-invoices	<i>Post-audit</i>
The definition of e-invoice	An invoice which is issued, transmitted, and received in a structured electronic format that enables automatic and electronic processing of the invoice.
The extent of the mandatory nature of e-invoices	<p>The mandatory nature of sending e-invoices as of 1 April 2019:</p> <ul style="list-style-type: none"> ▶ Mandatory for all Swedish public sector entities in mutual invoicing ▶ The public sector entities with over 50 employees must submit their outgoing orders for products or services electronically <p>As of 1 April 2019, all suppliers must issue e-invoices of the purchases are made within the framework of public procurements pursuant to one of the following Public Procurement Acts:</p> <ul style="list-style-type: none"> ▶ LOU (2016:1145) ▶ LUF (2016:1146) ▶ LUFFS (2011:1029) ▶ LUK (2016:1174) <p>The mandatory nature of accepting and processing e-invoices on 1 April 2019:</p> <ul style="list-style-type: none"> ▶ E-invoices are mandatory for all public sector entities

⁴⁵ The response from the DBA to an inquiry by EY

	<ul style="list-style-type: none"> ▶ E-orders are mandatory for those suppliers whose customers are public sector entities with more than 50 employees 	
	B2G	B2B
The mandatory document formats for exchanging invoices with the public sector and/or between transaction partners	<ul style="list-style-type: none"> ▶ Peppol BIS Billing 3.0 preferably by SFTI (eProcurement in Sweden⁴⁶) ▶ Other formats that are compliant with the EU requirements may be used based on agreements ▶ Peppol Catalog Without Response 3 ▶ Peppol BIS Punch Out 3 ▶ Peppol BIS Ordering 3 	N/A
Other common document formats used between transaction partners	CII format version Peppol BIS 3	<ul style="list-style-type: none"> ▶ Peppol BIS Billing 3.0 ▶ Svefaktura ▶ SFTI Fulltextfaktura ▶ PDF ▶ Finvoice
The mandatory platforms that must be subscribed to for exchanging e-invoices	No mandatory infrastructure	N/A The use of Peppol is very common
Other platforms that can be used for sending e-invoices	N/A	N/A

Legislation

As of 1 April 2019, all public sector entities in Sweden are obligated to accept the e-invoices and exchange e-invoices with one another. The suppliers whose customers are public sector entities must also submit e-invoices to those suppliers. The legislation which regulates the use of e-invoices in the public sector in Sweden:

- ▶ The Accounting Regulation (Förordning (2000:606) om myndigheters bokföring, § 21f)
- ▶ The Electronic Information Exchange Regulation (Förordning (2003:770) om statliga myndigheters elektroniska informationsutbyte, § 3). The law was last amended in 2021, making e-public procurements mandatory
- ▶ By the E-invoice Act, the Swedish national legislation was harmonised with the EU e-invoicing Directive and the following requirements were established:
 - ▶ The act covers the entire public procurement process over and below the thresholds established by the EU and is also applicable to direct procurements.
 - ▶ The act obligates public sector suppliers to issue e-invoices in the case of all contracts entered into after 1 April 2019.
 - ▶ The public sector must be capable of accepting and processing e-invoices in compliance with the EU standard EN 16931. There are, however, some exceptions that apply to national security, specific privacy requirements, etc.

The DIGG has also issued an accompanying regulation that places all public sector entities under the obligation to register with Peppol. Thereat, the supervisory authority (DIGG) may fine any parties that do not observe the

⁴⁶ <https://joinup.ec.europa.eu/collection/eprocurement/document/sfti-eprocurement-sweden-sfti>

legal requirements. The law permits using different formats which may be specified and agreed between transaction partners by bilateral contracts.

General logic of sending and receiving e-invoices

Sweden does not have a mandatory infrastructure managed by the state or a single platform for sending, receiving, and processing e-invoices. All public sector agencies must provide an e-invoice supplier portal and the public sector entities with more than 50 employees must also provide a supplier portal for product catalogues and orders. This means that private sector is providing e-invoice related services to the private as well as public sectors.

Logic of sending and receiving B2G e-invoices via the Peppol network

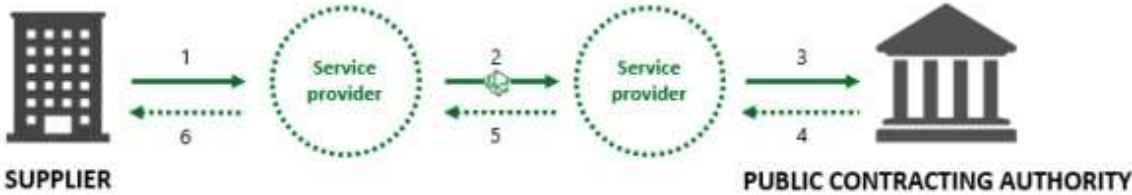


Figure 9. The logic of using B2G e-invoices in Sweden. Source: Pagero, 2021.

Stages of the use of B2B e-invoices:

- ▶ The supplier sends the information of the invoice to the service provider transferring the e-invoice (SSP).
- ▶ SSP / the supplier sends the final e-document to the receiving service provider (RSP) / vendor in the Peppol format.
- ▶ RSP / the vendor sends the e-document received to the respective public sector entity in the Peppol BIS format.
- ▶ Any retroactive communication from the vendor to the supplier, i.e. confirmation of the invoice or confirmation of accepting or rejecting the document, is voluntary.

Logic of sending and receiving B2B e-invoices (post-audit)



Figure 10. The Swedish e-invoicing infrastructure and the logic of using e-invoices. Source: Pagero, 2021.

Stages of the use of B2B e-invoices:

- ▶ In the case of B2B invoices, Sweden is using the post-audit model, which means that the circumstances of an operation are audited after the economic operations, if necessary.

- ▶ Suppliers and vendors can exchange documents in different formats and by using different infrastructures depending on the needs and preferences of the business.
- ▶ Operators and service providers are tasked with making sure that the documents are drawn up and move based on appropriate standards and are archived appropriately.

Volume of the market of e-invoices

According to the Swedish e-invoice system management agency Agency For Digital Government (DIGG), there are 328 registered e-invoice operators in Sweden that have officially subscribed to the Peppol network.⁴⁷

Sweden is not collecting statistical information about the volume of e-invoices and it is thus not possible to specify the size of the Swedish e-invoice market in the private sector. The Swedish public sector agencies, however received 4.5 million e-invoices in 2020 which formed 84% of all invoices received. Public sector entities placed 773,000 e-orders in 2020.

4.3 Finland

As of 1 April 2019, all public sector entities are obligated to accept e-invoices, including those which are compliant with the EU e-invoice standard or the Finvoice 3.0 standard. The authority responsible for the e-invoice programme is the State Treasury, which monitors the issues concerning the e-invoice infrastructure, works on steering and developing standards and various different technical solutions, and collects statistical data on the volume of e-invoices with the Bank of Finland.

Below, we list the e-invoice standards used in Finland, provide an overview of the e-invoicing infrastructure with descriptions of the processes of sending and receiving B2B and B2G invoices, and specify the estimated volumes of e-invoices in Finland.

Responsible authority	State Treasury (Ministry of Finance)	
Legislation	<p>The e-public Procurement and Electronic Invoicing Act (241/2019), which entered into force on 1 April 2019</p> <p>The Finnish e-invoice law includes two national additions to directive 2014/55/EU:</p> <ul style="list-style-type: none"> ▶ The Directive is extended at the national level to the invoices based on the contracts exceeding the national thresholds, but remaining below the EU thresholds. ▶ The buyer may request the seller issue an invoice as an e-invoice compliant with the EU requirements if the annual turnover of the latter is at least 10,000 euros. 	
The status of e-invoices	E-invoices are mandatory for the public sector	
The mandatory nature of e-invoices	B2G: mandatory to send; B2B: voluntary – the right to request e-invoices from businesses of the annual turnover of over 10,000 euros	
The model of e-invoices	<i>Post-audit</i>	
The definition of e-invoice	An electronic invoice which must be prepared, sent, and received in a structured electronic format allowing for automatic processing of the invoice	
The extent of the mandatory nature of e-invoices	<p>The mandatory nature of sending e-invoices:</p> <ul style="list-style-type: none"> ▶ As of 1 April 2019, mandatory for all Finnish suppliers if the invoice is submitted to a public sector entity. <p>The mandatory nature of accepting and processing e-invoices:</p> <ul style="list-style-type: none"> ▶ As of 1 April 2019, all public sector entities must accept and process e-invoices. ▶ As of 1 April 2021, all public sector entities in are obligated to accept and process e-invoices which are compliant to the EU directive. ▶ Mandatory use of e-invoices is not extended to the territory of Aaland. 	
	B2G	B2B

⁴⁷ EY's data inquiry to DIGG

The mandatory document formats for exchanging invoices with the public sector and/or between transaction partners	As of April 2021, public sector entities only accept invoices that are compliant with TEAPPSXML 3.0, Finvoice 3.0 and EN 16931-1. Private sector can also only send e-invoices to the public sector by using the Peppol network and thus the Peppol BIS Billing 3.0 standard.	N/A
Other common document formats used between transaction partners	N/A	PDF, TEAPPSXML, Finvoice
The mandatory platforms that must be subscribed to for exchanging e-invoices	Public sector entities must accept e-invoices from suppliers and businesses via their own business software applications and the Opus Capita Solutions platform. If it is not possible for a business to use the afore-mentioned channel, they can use the following channels to send e-invoices to public sector entities: <ul style="list-style-type: none"> ▶ Basware Supplier Portal ▶ Handi Supplier Portal 	N/A

Logic of sending and receiving e-invoices

All e-invoice senders and recipients have their own mediators in Finland. This role may be fulfilled by a bank or an operator in charge of the process of sending and accepting e-invoices. The banks and operators are connected by using the so-called square model, which is part of the open e-invoice network.

Figure 11 describes the Finnish process of sending e-invoices and their square model:

- ▶ The model is based on the principle of vendors and suppliers being able to use freely chosen operators for sending and receiving e-invoices.
- ▶ Vendors and suppliers have data exchange contracts with operators of their choice.
- ▶ The operators are responsible for converting the information.
- ▶ The operators also have mutual contracts for data exchange.

The information exchange between operators is generally free, although there may be exceptions.

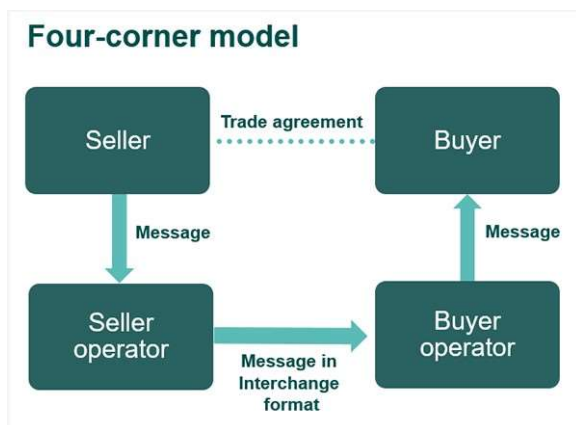


Figure 11. The Finnish e-invoicing infrastructure and the logic of using e-invoices. Source: Valtiokonttori, 2021.

Logic of sending G2B e-invoices

Finnish public sector entities are capable of sending e-invoices to foreign businesses and the businesses whose e-invoice operator is OpusCapita via the Peppol network. Attachments can be sent with e-invoices. If a business is capable of accepting e-invoices, they can register appropriately and provide their e-invoice address to the respective agency or the State Treasury.

Logic of sending B2G e-invoices

Opus Capita Solutions is the e-invoice operator of the Finnish public sector. Finnish public sector entities only accept e-invoices; paper invoices are only accepted in exceptional cases. Attachments can also be sent with e-invoices. If a supplier has entered into a contract with Opus Capita for sending e-invoices, they can use the Opus Capita network or the Peppol network for sending e-invoices to the public sector entities in Finland. If a supplier cannot use the afore-mentioned channels to send e-invoices, they may use the following two alternative channels:

- ▶ Post Network Services allows the Finnish businesses which have registered in the platform to generate and send e-invoices. The platform checks the accuracy of the data provided by businesses and ensures successful submission of e-invoices to the vendor.
- ▶ For submitting e-invoices via Basware Supplier Portal, businesses must register as suppliers in the platform, after which they must be approved by public contracting entities as 'supplier candidates'. Both Finnish and foreign businesses can register as suppliers on the platform and the e-invoices generated are retained in the database of the platform for three months. Basware Supplier Portal will remain in use until the launch of the new Basware service.

Logic of sending B2B e-invoices

There is no uniform e-invoice platform for the private sector; businesses are free to choose their preferred service provider. Trade partners can exchange documents in several different ways. There may also be rules which directly or indirectly permit, prohibit, or restrict using certain communication or marketing channels. Based on an assessment of the Estonian ITL, the Finnish system is very well functioning and their standards have changed in time with the EU standards.

Volume of the market of e-invoices

According to the information obtained from Valtiokonttor, there are 19 e-invoice operators in Finland, plus 11 banks. In 2019, 300 million e-invoices were sent in Finland in total. The statistical data available does not, however, specify how the total amount of e-invoices is distributed between B2B, B2G, and private individuals. An estimated 80% of all B2B invoices in Finland are e-invoices.

The government sector sends 13 million invoices in Finland, on average, of which 39% are e-invoices, and receives approx. 1 million invoices, of which 97% are e-invoices. An estimated 80% of all invoices received by local authorities are e-invoices.

In 2019, 271,000 businesses in Finland had concluded contracts for sending e-invoices, which means that those businesses had entered into contracts with their banks and operators for sending e-invoices. 291,000 businesses in Finland had concluded contracts for accepting e-invoices in 2019, which means that those businesses had entered into contracts with their banks and operators for accepting e-invoices.

Table 6. The matrix of obstacles and support measures by the e-invoice market participants

	Obstacle/support					
	Technical		Awareness and motivation; business		Financial	
Undertakings	<p>The different IT systems of a business (warehouse, sales, production) may not be compatible, as a result of which it would be burdensome for the business to use e-invoices and switching to e-invoices may not result in the expected savings.</p> <p>The process of sending and receiving e-invoices may be too complicated, time-consuming, and confusing for the business due to the functionalities of some business software applications and the complexity of interfacing.</p>	<p>General digitalisation support for businesses with an opportunity to update the business software and thereby bringing the internal processes and operations of the business along with different departments together on one digital platform.</p> <p>Online trainings and seminars to increase IT literacy with an aim of expanding the use of e-invoices among micro and small enterprises.</p>	<p>The level of awareness of businesses of the nature of e-invoices and the use thereof is low.</p> <p>Micro enterprises with a low volume of invoices have no need for e-invoices.</p> <p>For using e-invoices, businesses must submit separate applications in the commercial register and get registered.</p>	<p>Trainings and seminars prepared and organised by the Estonian Assembly of Accountants with the respective guidelines to increase IT literacy and explain the benefits arising from using e-invoices.</p>	<p>It may not be feasible from the economic perspective for micro and small enterprises to send e-invoices.</p> <p>In the case of those businesses which use several different systems in their invoicing processes, the cost of harmonising their systems may exceed the benefits gained.</p>	<p>Small-scale sending and receipt of e-invoices is free for businesses in an e-invoice environment managed by the state.</p> <p>Digitalisation support for larger businesses for harmonising different IT systems.</p>
Accounting undertakings	<p>Switching to e-invoicing is perceived as a time-consuming process which makes accounting service providers forego this.</p> <p>The user interface provided by the business software may also not be suitable or meet the expectations of the accounting service provider.</p>	<p>Trainings along with an environment associated with the use of e-invoices which would help dispel the myths about e-invoices, offer technical support, and enable to obtain real time assistance.</p> <p>Harmonisation of the demands and needs of the end users of the user interfaces of</p>	<p>The lacking awareness of smaller accounting service providers of the nature of e-invoices, their low level of IT literacy, and the fear of decreasing workload due to an increase in the volume of e-invoices.</p> <p>For the large accounting bureaus with heavy workloads, the limited use of e-invoices is an issue.</p>	<p>Trainings and seminars prepared and organised by the Estonian Assembly of Accountants with the respective guidelines to increase IT literacy and explain the benefits arising from using e-invoices – processing e-invoices enables accounting service providers to process more invoices/customers in the same amount of time.</p>		

		business software applications based on the same logic.				
Accounting software developers	<p>The business software enables sending e-invoices; it does not enable receiving such invoices.</p> <p>There is no central register of places of business.</p>	<p>A standard for sending, receiving, and generating e-invoices developed in cooperation of the state and market participants.</p> <p>The entire process should be based on the 'one click' logic and be as intuitive and simple as possible for the end user.</p> <p>The state should create a central register of places of business (for example in the e-Business Register).</p>	<p>Business software providers do not wish to change the configurations in a way which may put to risk the users' satisfaction (forcing them to use e-invoices).</p> <p>Different user interfaces due to the lack of uniform standards and rules applicable to business software developers increases the level of complexity for the user and business software developers may not be aware of the actual needs of businesses and accountants.</p>	<p>A standard for sending, receiving, and generating e-invoices developed in cooperation of the state and market participants which would apply to all ERPs.</p>	<p>The issues of the business software providers with smaller turnovers and circles of users are concerned with different standards and interfaces that require constant attention and the updating and development of which may be significantly time-consuming and expensive.</p>	<p>The support measure should enable business software developers to harmonise the logic of the user interfaces of their software applications with respect to e-invoices.</p>

The measures supporting switching to e-invoicing and the target groups discussed in the table above (Table 6) are illustrated in brief in the figure below (Figure 12).

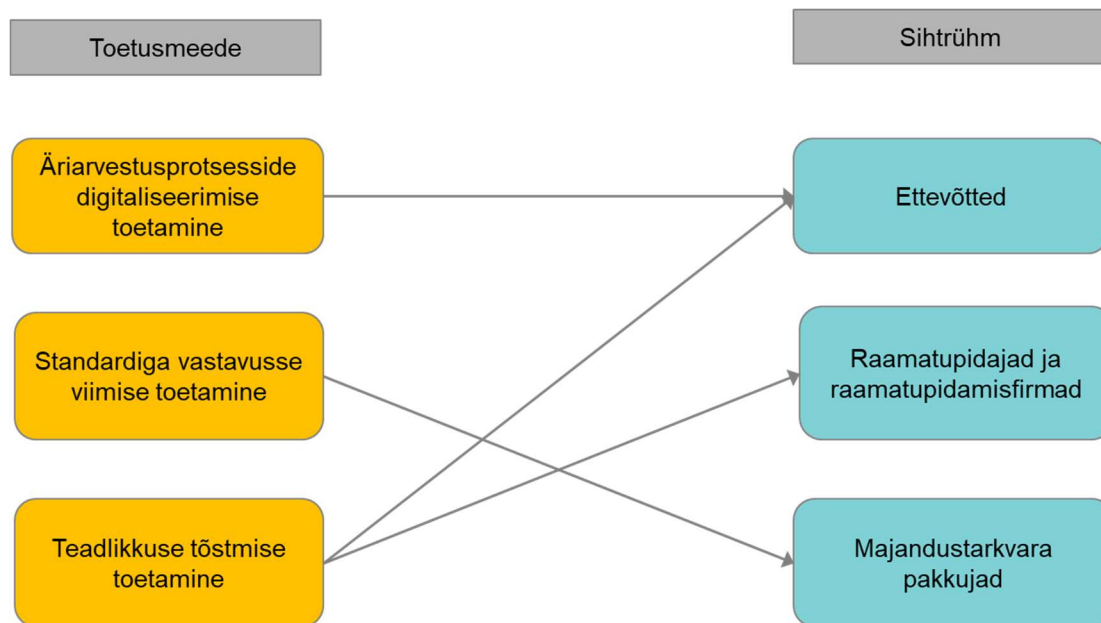


Figure 12. The measures for supporting the transition to e-invoicing and the target groups

Support measure	Target group
Supporting digitalisation of accounting processes	Businesses
Supporting bringing systems in compliance with the standard	Accountants and accounting companies
Supporting awareness-raising	Business software providers

As the table above (**Table 1**Table 6) shows, the obstacles and the support measures used to respond to the obstacles differ and the different parties to the e-invoicing infrastructure may require relatively different approaches, which would enable a wider use of e-invoices in the private sector. The specific targets of the support measures depend on the recipients of the support and the type of the obstacles.

Measure	Supporting activities	Outcome	Time	Cost
Undertakings				
General digitalisation support for businesses with an opportunity to update the business software and thereby bringing the internal processes and operations of the business along with different departments together on one digital platform.	Introduction of business software Automation of the accounting processes of the business Integration of the accounting software solutions of the business	The level of digitalisation of businesses improves, which in turn increases the productivity and automation of businesses, allowing switching to e-invoices thanks to the harmonisation of the internal systems. E-invoices will become a logical part of the harmonised business and cash register system.	Depending on the size and level of digitalisation of the business and the complexity of the existing processes 6–12 months	€15,000–100,000
Trainings and seminars with guidelines for improving IT literacy, explaining the benefits arising from using e-invoices, and switching to e-invoicing	Organising and conducting training seminars It would be reasonable to organise those activities in cooperation with the professional organisation of accountants, the Estonian Assembly of Accountants.	The measure is primarily intended for micro and small enterprises, as well as for accounting service providers. As a result of the measure, the awareness of the parties will increase along with the user of e-invoices at smaller economic entities. The trainings can and should be provided by training undertakings, accounting bureaus, and the Estonian Assembly of Accountants.	The duration of the trainings and seminars would depend on the number of participants and the volume of the programme. The estimated duration would be 4 h per training.	Up to €10,000

Measure	Supporting activities	Outcome	Time	Cost
Accountants and accounting service providers				
Trainings and seminars with the respective guidelines to increase IT literacy and explain the benefits arising from using e-invoices – processing e-invoices enables accounting service providers to process more invoices/customers in the same amount of time.	Organising and conducting training seminars It would be reasonable to organise those activities in cooperation with the professional organisation of accountants, the Estonian Assembly of Accountants.	As a result of the measure, the level of IT literacy of accountants and their general awareness of e-invoices and the benefits arising from using e-invoices would improve. The trainings and seminars would help dispel the myths about e-invoices and increase the productivity of service providers, allowing them to provide services which create more added value.	The duration of the trainings and seminars would depend on the number of participants and the volume of the programme. The estimated duration would be 4 h per training.	Up to €10,000
Accounting software providers				
The EU e-invoice standard implemented in cooperation of the state and market participants	Making the software developments required to ensure compliance with the EU e-invoice standard in business software.	A harmonised standard and a user interface based on one common logic would enable business software users to send e-invoices as a default solution to those businesses which have indicated in the e-Business Register that they accept e-invoices.	Depending on the accounting software provider 6–18 months	€30,000–100,000
The state should create a central register of places of business which would allow sending e-invoices to specific economic entities.	Taking into use places of business (presumably in the commercial register)	This would solve the issue of a business having one legal address, but places of business in several different locations. For example, a trade enterprise is registered in Tallinn, but is operating in nineteen locations in Estonia to which suppliers cannot send direct e-invoices.	Not possible to assess based on the information available in this study.	Not possible to assess based on the information available in this study.

5. Conclusions on the research questions

Below, we discuss the main conclusions of the report by the questions posed in the technical specifications (TS) of the public procurement. Use of e-invoicing by the public sector (TS 2.1.1)

- ▶ The data of the State Shared Service Centre, the commercial register, and the national register of state and local government authorities show that the central government agencies served by the State Shared Service Centre are fully capable of accepting e-invoices.
- ▶ When it comes to other public sector entities, there is full certainty of them being capable of accepting e-invoices in the case of 90% of the entities, as they have specified their e-invoice operators in the e-Business Register. The remaining 10% are subdivisions of local government authorities and, based on random data collection, it is known that they receive the service from the local government authority and the capability to accept e-invoice is thereby also ensured.
- ▶ Issuing of invoices by public sector entities in formats which are not e-invoices is common, as many local government authorities send invoices for municipal services by e-mail (kindergartens, schools).
- ▶ Keeping in mind that approx. 1 million invoices are currently moving as e-invoices from the private sector to state and local government authorities and the estimated saving on the different processes of processing the invoice is approx. 1 euro per one e-invoice, the savings related to e-invoices compared to the time before e-invoices when no invoices were issued in this format may be estimated to amount to 1 million euros per year.

Statistical data of the use of e-invoices (TS 2.1.2)

- ▶ Estonia does not currently collect statistical data about the use of e-invoices, but the indirect data obtained in the course of the study revealed the following volumes of using e-invoices:
 - ▶ The annual volume of the e-invoice payment orders sent to online banks is approx. 23 million invoices, based on the statistics of the Bank of Estonia. This figure mainly consists of invoices sent to private individuals.
 - ▶ The estimated share of e-invoices in the total volume of all invoices issued is 45% (includes the e-invoice payment orders sent to banks).
 - ▶ Leaving aside the e-invoice payment orders sent to banks, e-invoices form approx. 23% of the total volume of the invoices issued by businesses.
 - ▶ The share of e-invoices is even lower among smaller enterprises and is estimated to be limited to 5–10%.
 - ▶ The volume of the invoices issued to the public sector is estimated to amount to at least 1 million invoices per year.
- ▶ The main standard used for exchanging e-invoices in Estonia is the Estonian e-invoice standard which is not being updated.

Issues related to the use of e-invoices (TS 2.1.3)

- ▶ The main issues of the senders of e-invoices include the following:
 - ▶ Invoice senders do not have the capability of sending e-invoices; various different portals can be used to send e-invoices for free, but there is no habit of using such portals.

- ▶ Configuration of business software applications for sending e-invoices requires excessive operations in the case of some applications.
- ▶ Those e-invoice senders who are using e-invoice portals for sending invoices draw up their invoices twice: in their own business software which either does not have the capability of sending e-invoices or is not configured appropriately, and in one of the e-invoice portals (according to RIK, only more than 20,000 legal persons have used e-arveldaja for sending e-invoices, while the arved.ee portal of Unifiedpost has been used for sending e-invoices by approx. 16,000 legal persons).
- ▶ The main issues of the recipients of e-invoices include the following:
 - ▶ The invoice recipient does not have the capability for accepting e-invoices (has not concluded the contract with an operator).
 - ▶ Recipients of e-invoices occasionally experience issues due to the restrictions of the Estonian e-invoice standard, incl. concerning the quality of the data, as the Estonian standard does not ensure sufficient accuracy at the level of an invoice line, for example, the use of classifications, or enclosing additional files to the invoice.
- ▶ An issue experienced by accounting service providers is that their clients, i.e. businesses, are not always interested in using e-invoices or cannot use them due to technological or business process-based restrictions.
- ▶ Most of the commonly used business software providers support wider use of e-invoices.

How to support the transition to a wider use of e-invoices in the private sector? (TS 2.1.4)

- ▶ In the case of businesses, we would advise providing a more general support for digitalising accounting processes which would involve the optimisation of accounting processes, switching to using a business software application, and the mutual integration of systems if it is connected to the transition to e-invoicing.
- ▶ We would advise providing trainings and information about e-invoices to the accountants of businesses and accounting service providers to improve their knowledge on the benefits of e-invoices, and to alleviate the fear of the transition to e-invoices being too complicated.
- ▶ We would advise to support business software providers in the implementation of the EU e-invoice standard, as this calls for a financial investment and software developers prefer postponing this investment, even though they feel the need for a modern standard.
- ▶ We advise to provide accountants and accounting service providers targeted training and information events on e-invoicing and real time economy in general for the following purposes:
 - ▶ Increasing the awareness of the possibilities for using e-invoices and reducing the fear of the complexity of the transition to e-invoicing
 - ▶ Increasing the activity of using e-invoices, thereby improving the quality and presumable efficiency of the invoicing processes of businesses
 - ▶ Creating the prerequisites for future implementation of real time economy solutions, as e-invoices are just the first prerequisite for implementing RTE

What are the experiences of Nordic countries with the transition to e-invoicing? (TS 2.1.5)

- ▶ Finland, Sweden, and Denmark have made e-invoices mandatory in the transactions with the public sector.

- ▶ There is the national e-invoicing infrastructure NemHandel functioning in Denmark which is mandatory to use to issue invoices to the public sector, but can also be used for transactions between businesses.
- ▶ The use of the Peppol network for circulating invoices is common in the Nordic countries.
- ▶ Different countries use different standards, but are clearly moving towards using the harmonised EU standard.

Making the EU standard mandatory (TS 2.1.6)

- ▶ Implementation of the EU e-invoice standard would help solve various different issues related to using e-invoices, which is why we would advise to take the following steps:
 - ▶ Conducting a project for testing the transition to the EU e-invoice standard (so-called POC – Proof of Concept) for testing the different scenarios of using e-invoices to determine how it would function in different types of usage cases (incl. permanent e-invoice payment order, e-receipt, etc.).
 - ▶ Agreeing on the business rules and documenting the rules in the form of the Estonian CIUS (Core Invoice Usage Specification) to provide specific instructions for eliminating the current deficiencies (further mandatory data fields and the rules for filling in the fields) which in turn would improve the data quality of e-invoices.
 - ▶ Proposing the e-invoice working group of the ITL, for example, to develop the Estonian CIUS if the test project conducted before the transition period reveals the respective need.
 - ▶ Using the PEPPOL BIS 3 specification, i.e. the guidelines for using the EU e-invoice standard (CIUS based on CEN/EN 16931:2017), in the transition period until the Estonian CIUS has been developed.
 - ▶ Switching to using the Peppol network, which would solve the issues with roaming and enable new operators to enter the market (if this is profitable from the business perspective, which would be likelier in the case of providing good additional services, taking into consideration the volume of the Estonian market).
 - ▶ Supporting the developments of EU e-invoice standards in business software solutions (see TS 2.14 above). For the period of smooth transition to the EU e-invoice standard, different API end points can be developed in business software solutions for different formats, i.e. the solutions would include ‘both permitted and EE-XML with an expiry date’ and ‘only UBL permitted’ after the expiry date.
- ▶ The transition to the EU e-invoice standard will not bring direct expenses for those businesses which are already using e-invoices, especially if the business software developer’s costs of switching to the new standard were compensated to a significant extent. There may be a small impact on businesses due to the higher requirements for the quality of data entry (see chapter 3.5 for more information).

7. Annex 1

The annex to the report highlights in closer detail the information on the collection and analysis of primary and secondary data arising from the basic methodology.

The method of data collection is described in Table 7.

Table 7. Description of the data collection methods

Sample	Questionnaire
Interviews	
<p>The interview sample included the following parties:</p> <ul style="list-style-type: none"> ▶ State Shared Service Centre ▶ Centre of Registers and Information Systems ▶ Estonian Chamber of Commerce and Industry ▶ Estonian Banking Association ▶ Business software providers <ul style="list-style-type: none"> ▶ Merit Tarkvara ▶ Directo ▶ Standard Books ▶ Excellent Business Solutions ▶ Account Studio ▶ Skriining ▶ Intellisoft ▶ RVsoft ▶ Tresoor ▶ Operators <ul style="list-style-type: none"> ▶ BillBerry ▶ Finbite ▶ Telema ▶ UnifiedPost ▶ RIK/e-arveldaja ▶ CostPocket ▶ Kaubamaja Group 	<p>The structured format was used for conducting interviews in this study, which means that the research team asked the interviewees questions aligned with the research problem and purpose of the research and registered the responses. The phrasing of the questions and the order of asking the questions were the same in the case of all participants in the project.</p> <p>The research team want to find answers to questions about the organisation of the technical side of an e-invoice, the current situation of e-invoices in Estonia, and the preparedness of different market participants for the transition to e-invoices.</p> <p>The basis of the interviews was developed based on acknowledge social science practices to minimise the questionability of the data and ensure standardised and high-quality data.</p> <p>The information collected in the course of all interviews was accumulated in a summarised report.</p> <p>In the case of business software providers, their technical preparedness for sending and receiving e-invoices and for the transfer to the EU standard with CIUS was determined.</p> <p>Operators were questioned to obtain an overview of the market, the potential issues of different parties were mapped, and inputs were collected in connection with the transition to the EU standard and the potential support measures provided by the state.</p>
Focus group interviews	
<p>The focus group samples formed were homogeneous, i.e. formed based on a common feature. In this manner, e-invoice operators, business software providers, and accounting service providers, who all have differ-</p>	<p>The plans for the semi-structured focus group interviews included open questions, the order of which could be changed by the interviewers, if necessary, and the interviewers were also able to pose steering, specifying questions.</p>

<p>ent positions in the market, experiences, and perspectives of the topic in question, were allocated into different focus groups.</p> <p>In order to ensure an efficient process of conducting focus group interviews, 6–10 people were included in each focus group.</p>	<p>The interview questions were grouped by the purpose (the research questions phrased by the contracting authority) which means that the focus group interview questions were divided in five categories for best results: opening questions, introducing questions, transition questions, key questions, final questions.</p> <p>Using the types of questions listed above in a pre-determined order ensured that the research team was able to obtain as complete information as possible from the focus groups.</p>
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The data sources used by the project team in the course of conducting the study are specified in Table 3. The data collection was based on the methods described in the basic methodology. First, requests for information were sent to the e-invoice operators operating in Estonia, interviews were conducted with stakeholders from private and public sectors, and focus groups interviews were organised with the related parties to validate the information collected, in addition to collecting information.

The table below describes which sources the data were collected from and which methods were used.

Table 8. Mapping of data sources

	Data sources			Comment
	Input data	Interviews, public	Interviews, private	
What is the level of preparedness of public sector entities to accept e-invoices?	State Shared Service Centre, Centre of Registers and Information Systems	State Shared Service Centre, Ministry of Finance, Ministry of Economic Affairs and Communications, Centre of Registers and Information Systems	Operators, PMEN	We map the extent to which operators are helping to convert PDF invoices into e-invoices and the purposes for this conversion.
In what formats do businesses issue invoices (to the public sector)?	Operators, telecommunication and infrastructure undertakings	Centre of Registers and Information Systems / e-invoice server	Operators, business software, accounting bureaus	We ask how many business software applications are using the service of the Centre of Registers and Information Systems and how intensively it is applied.
What are the problems experienced by e-invoice senders, recipients, and operators?	Register of e-invoice recipients		Operators, Estonian Association of SMEs, business software, accounting bureaus, plus banks, the Banking Association	We ask what are the greatest obstacles and would removing the obstacles motivate the transition to e-invoicing. We examine the financial cost/ benefit of switching to e-invoicing.

<p>What are the attitudes towards e-invoice standards? Is the Estonian e-invoice standard functioning, does it take into consideration special cases? Is a switch to one single (EU) standard required?</p>		<p>State Shared Service Centre, Ministry of Finance, Centre of Registers and Information Systems</p>	<p>Operators, business software, accounting bureaus</p>	<p>We determine the level of satisfaction with the currently applied e-invoice standard and examine if it works in special cases. We collect suggestions for how to better implement the e-invoice standard.</p>
<p>Why have businesses not started using e-invoices more widely?</p>			<p>Operators, business software, accounting bureaus, Estonian Association of SMEs, Estonian Chamber of Commerce and Industry</p>	<p>We collect suggestions for how to ensure a wider use of e-invoices. How to turn e-invoices into a norm? What could be the model of paying for e-invoice services? Micro entrepreneurship? Changing the rules applicable to self-employed person?</p>
<p>Is the regulation complied with? (incl. the EU directive) Where is it necessary to issue an e-invoice? What have foreign countries done in the field of e-invoicing?</p>	<p>State Shared Service Centre, Centre of Registers and Information Systems</p>	<p>State Shared Service Centre, Ministry of Finance</p>		<p>In addition to the regulation, we examine the example of other countries of what has been done to ensure wider use of e-invoices (incl. the impacts of amendment of the legislation in Finland)</p>
<p>Is register of e-invoice recipients functioning as needed?</p>	<p>Centre of Registers and Information Systems</p>	<p>Centre of Registers and Information Systems</p>	<p>Incl. the operators using this information</p>	<p>We ask what are the greatest obstacles preventing the use of the register and would removing the obstacles motivate more active use of the register.</p>

Table 9. Comparison of the Estonian and EU e-invoice standards with respect to the data fields that must be filled in a machine-readable e-invoice

The EU e-invoice standard: EN 16931-1:2017	Estonian e-invoice standard: EVS 923:2014
Process and invoice indicators	Only invoice number is required in Estonia, reference numbers are not mandatory
Time	Only the date is mandatory in Estonia
Information about the seller	The name, address, registry code, VAT identifier are provided automatically
Information about the buyer	The name, address, registry code, VAT identifier are provided automatically
Information about the seller's tax representative	IBAN
Reference to the contract	Not mandatory in Estonia

Details of transmission	Not mandatory in Estonia
Payment orders	In Estonia, the payment order number comes from the bank
Credit or debit information	Not mandatory in Estonia, but can be provided in an invoice
Information about the number of entries of the invoice	The options of accumulating everything on one line or specifying separately – depends on the customer's wishes
Total amounts of the invoice	Compliant with EU standard
Distribution of value added tax	Compliant with EU standard