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# About eInvoicing and Peppol

# The global e-invoicing and tax compliance report: Watch the tornado!

billentis, April 2024

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# 0. Executive Summary

'The global e-invoicing and tax compliance report: Watch the tornado!' provides a comprehensive analysis of the current landscape and future outlook of electronic invoicing and related digital trade practices. Authored by pioneers Marcus Laube and Bruno Koch, this edition delves deeply into the shifts and innovations shaping this space, driven significantly by advancements in technology and regulatory requirements, with the global volume of invoices processed electronically poised to increase dramatically. It is within this context that we have titled our report 'Watch the Tornado,' highlighting the necessity for both users and solution providers to stay informed and prepared for these evolving trends and findings:

+ **Market Growth**: The e-invoicing market is expected to see substantial growth, with projections indicating a surge in both adoption rates and market value driven by the need for greater compliance and efficiency in business transactions. As of 2024, the market anticipates handling approximately **560 billion invoices annually**. Presently, around **125 billion** of these invoices are transmitted electronically. The current market value stands at $ 8.9 billion and is projected to ascend to approximately **$ 23.7 billion by 2028**.

+ **Regulatory Impact**: Tax authorities globally are increasingly adopting electronic invoicing as a strategic measure to combat tax evasion. Many are implementing **Continuous Transaction Control (CTC) models** that facilitate real-time or near-real-time transaction processing and auditing. Initiatives such as 'VAT in the Digital Age' (ViDA) in Europe, along with the widespread adoption of Peppol specifications in Asia, suggest a growing preference for **four and five corner models**, with the latter to enhance compliance and operational efficiency simultaneously. These implementations are frequently coupled with **B2B mandates** that require electronic invoicing. Looking ahead, it is likely that these requirements will expand to include additional business documents and Environmental, Social, and Governance (ESG) criteria.

+ **Integrated Digital Trade (IDT)**: Beyond electronic invoicing, the shift toward Integrated Digital Trade (IDT) represents a comprehensive strategy for automating both business transactions and financial operations. This movement is bolstered by governmental policies that mandate the incorporation of additional business documents and encompass processes such as **payment, invoice financing, electronic procurement, and tax automation**. The approach to adopting IDT varies based on distinct value propositions and differs significantly between small and medium-sized enterprises (SMEs) and large corporations. While **SMEs** may focus more on integrating financial processes and tend to respond primarily to imminent regulatory mandates, **large enterprises** are likely to initiate projects proactively with an emphasis on automating supply chain processes.

+ **Technology Integration**: Emerging technologies such as **Artificial Intelligence (AI)** are increasingly integrated with e-invoicing systems, offering new efficiencies and capabilities. Leverage AI and blockchain to not only comply with regulatory frameworks but also to gain a competitive edge through improved transactional accuracy and security.

The e-invoicing landscape is rapidly evolving, underscored by technological advancements and significant regulatory changes. Organizations that adapt quickly to these changes, leveraging new technologies and models, will benefit from increased efficiency, compliance, and competitiveness in the global market. This report serves as a vital tool for understanding and navigating the complexities of e-invoicing and Integrated Digital Trade as they become standard practices worldwide.

# 1. Introduction

## 1.1 The purpose of the Report

Bruno Koch and Marcus Laube are distinguished pioneers in the realm of electronic invoicing from its inception. Since 1999, Bruno Koch has evolved billentis into the premier global consultancy specializing in electronic invoicing and tax compliance, authoring all preceding reports for the organization. Concurrently, Marcus Laube has established and overseen a variety of internationally operating service providers, in addition to leading pivotal industry associations. Both have contributed their expertise to numerous e-invoicing committees, including those affiliated with the European Commission. Marcus Laube has recently assumed ownership of billentis, with Bruno Koch continuing to contribute to the production of this report.

Motivated by favourable market reception, we are pleased to announce the release of the latest edition of our report on electronic invoicing and tax compliance. Since our previous publication in 2019, there has been a significant shift in the market landscape. The demand for tax compliance has accelerated the transition towards universal electronic invoicing, a development expected to occur in the near term. Furthermore, the range of solutions is expanding beyond electronic invoicing to encompass Integrated Digital Trade, encapsulating the entire spectrum of transactions between buyers and sellers. This progression is increasingly influenced by emerging technologies, notably Artificial Intelligence, alongside growing considerations for Environmental, Social, and Governance (ESG) factors. While initially predominant in Latin America and Europe, this trend is now gaining momentum across Asia, Oceania, and Africa.

As the industry moves towards universal electronic invoicing, many organizations continue to search for solutions tailored to their unique needs within a market burgeoning with service providers and solutions. It is within this context that we have titled our report 'Watch the Tornado,' highlighting the necessity for both users and providers to stay informed and prepared for these evolving trends. In this critical phase, accessing current information and guidance for selecting the most suitable solution and service provider is paramount.

## 1.2 Methodology

The authors possess extensive experience in the e-invoicing sector since 1997, pioneering two of the initial cloud-based e-billing and e-invoicing services in Europe and managing leading industry associations. They have served as independent consultants crafting business strategies, Requests for Proposals (RFPs), system assessments, and numerous technical and marketing plans for major invoice issuers and recipients, government entities, integrators, and solution and service providers. Throughout this period, they have continuously gathered critical data on pertinent markets, regularly disseminating their findings in industry reports.

The report draws on a comprehensive base of sources, including:

+ Data from public domains, meticulously compiled from thousands of resources over the years and refined for accuracy.
+ Precise official statistics, especially from countries with advanced electronic invoicing and tax reporting frameworks.
+ Country and sector-specific surveys.

- Data from significant invoice issuers and recipients across various sectors like telecommunications, utilities, financial services, public sector, healthcare, and retail, obtained from online publications or corporate responsibility and Environmental, Social, and Governance (ESG) reports.
- Information from leading service providers and aggregated industry association data.
- Market research conducted by external parties, representing insights from over 20,000 enterprises and 15,000 consumers.
- Verification of critical data through customer/provider confirmations and analysis of numerous corporate responsibility reports, often validating the share of paperless billing and invoicing.
- Extensive interviews with regional specialists.
- Direct insights from over 200 client consulting engagements across more than 50 countries.
- An amalgamation of the aforementioned data sources.

# 2. Market Characteristics

## 2.1 E-invoicing and Beyond – Terms and Definitions

### 2.1.1 Definition of E-invoicing

The term ‘e-invoice’ is used within the Business-to-Business (B2B) and Business-to-Government (B2G/G2B) contexts, specifically referring to the electronic transmission of invoices between suppliers and purchasers, without addressing data exchanges with tax authorities for reporting and control objectives.

In the **Western hemisphere**, e-invoicing signifies the digital transmission of invoices directly between suppliers and purchasers across various sectors, including businesses (B2B), public administrations (B2G), and consumers (B2C). In the United States, a distinction exists between ‘e-invoice’ for B2B transactions and ‘e-bill’ for consumer transactions.

European Union (EU) legislation provides a comprehensive definition for the B2B context, involving the electronic issuance and receipt of Value Added Tax (VAT) compliant invoices. It mandates the archival of e-invoices in their original digital format, even if a printed version is produced subsequently. This definition is widely accepted and includes digital invoices, primarily in PDF format. For B2G transactions, only structured formats qualify as e-invoices under EU directives. The definition for B2B transactions may evolve with the implementation of the 'VAT in the Digital Age' (ViDA) project.

In **Latin America**, the term ‘e-factura’ or ‘e-boleta’ refers to the digital transmission of sales invoice data to tax authorities.

In **Asia**, practices vary, with Singapore and some countries aligning with the Western definition, while others use the term for reporting sales data (e-tickets, e-receipts) to tax authorities. In countries like India, Indonesia, and China, e-invoicing is used for VAT invoice registration.

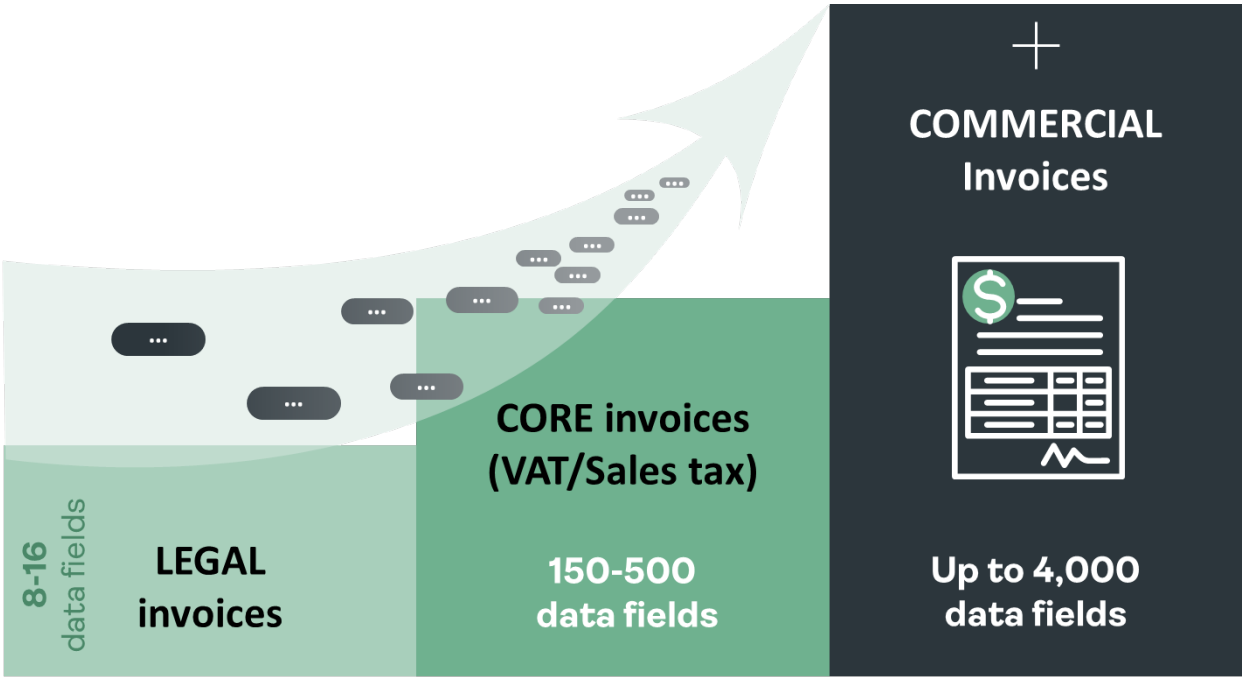
The future of e-invoicing is moving towards standardized structured data use across B2B and B2G mandates, aiming to standardize invoice exchange methods.

The term ‘e-billing’ refers to the electronic generation of bills for consumers (B2C) and government-to-consumer (G2C) transactions. Numerous stakeholders employ the terms ‘e-invoicing’ and ‘e-billing’ interchangeably, without distinguishing between them based on the recipient segment. Instead, they utilize one of these terms universally for all electronic invoice transactions.

billentis defines ‘invoice’/’bill’ and ‘e-invoice’/’e-bill’ for global statistical and predictive analysis. Legal definitions may vary, but excluded from the e-invoice category are:

- Financial documents that do not reflect a commercial transaction, accompanied by a 'request for payment', such as bank statements and waybills.
- Invoices that are entirely digital but do not meet tax compliance requirements due to deficiencies in integrity, authenticity, and readability.
- ‘Electronic invoices’, supplemented by legally significant paper-based summary invoices as components of the Electronic Data Interchange (EDI) ecosystem, are scanned, printed, or archived by recipients. In instances where only the paper version is maintained as the 'new' de facto original and assumes the role of the primary document.
- Asymmetric e-invoicing, where buyers retain the right to request a printed version of the invoice, which shall then be recognized as the legally valid original invoice.
- Bulk of paper invoices, despite the concurrent electronic transmission of invoice data to tax authorities or trading partners.

There are three recognized types of e-invoices: legal invoices, core (VAT-/Sales tax (ST)) invoices, and commercial invoices. Legal invoices meet tax compliance requirements with mandatory fields and authentication, preserved as the original valid invoice. Core invoices comply with tax and trade requirements, supporting automated processing. Commercial invoices, designed for specific industries, accommodate extensive data fields to enable process automation.




**Legal invoices:** Electronic invoices, which mandatorily include 8 to 16 essential fields along with the authentication of both the issuer and recipient, are exchanged between two entities acting as supplier and buyer. These digital, tax-compliant invoices serve as the legitimate original invoices. The exchange occurs directly between the entities, through service providers, or via platforms offered by tax authorities. These electronic invoices are meticulously preserved as they constitute the sole original invoices recognized by tax authorities and auditors for compliance purposes.

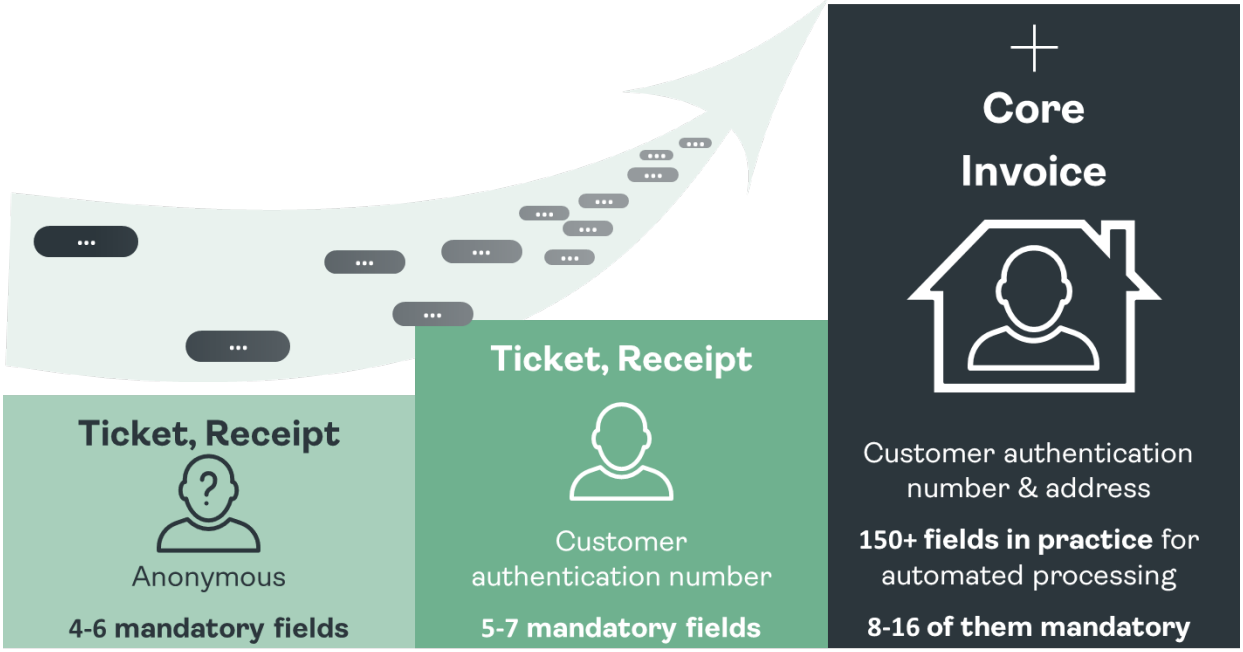
**Core invoices**: Compliant with the standards for VAT, Sales tax and trade invoicing, including the European Norm for EU-wide B2G electronic invoicing. This entails a comprehensive format featuring 150 to 500 fields to facilitate automated processing. Such invoices are commonly generated by accounting/ERP systems and serve as the foundation for electronic tax reporting, e-invoicing, and the automation of business processes.

**Commercial invoices**: The Universal Business Language (UBL) standard encompasses approximately 4,000 distinct data fields exclusively for invoicing purposes, leading to the development of UBL subsets tailored to particular user groups, such as NES, OpenPeppol, and UBL-TR. Industries such as healthcare and transport logistics heavily rely on these specialized commercial invoices to achieve full automation of their processes.

### 2.1.2 From Tickets to Core Invoices

In today's global market, customers across the majority of nations can seamlessly acquire products or services at the point of sale (POS) without undergoing extensive formalities. Upon completing a transaction, customers receive a receipt, which notably omits the inclusion of the customer's name. The transfer of electronic data to customers presents challenges, rendering automated processing complex or unfeasible.

For transactions surpassing several hundred euros in value, regulatory requirements in many jurisdictions necessitate customer authentication, incorporating their details into the payment confirmation. Consequently, the receipt is enhanced with the customer's primary information, elevating it to the status of a standard invoice.




Reflecting on developments a decade prior, it is observed that customers in certain forward-thinking countries, such as Chile, were incentivized through financial means (e.g., a more favourable VAT rate) to voluntarily disclose their identity at the POS.

The authors anticipate a trend towards stricter regulations on anonymous POS transactions as a strategy to combat tax evasion. This could manifest through legislative amendments lowering the threshold for anonymous purchases. Additionally, advancements in mobile technology, facilitating easy merchant and customer authentication via QR codes or applications embedding identity information, are likely to be a contributing factor. Indications are that a significant portion of invoices, in a broader legal context, will transition to core invoices. This shift is poised to enhance the electronic exchange and automated processing of these invoices.

**Receipts and tickets, previously issued anonymously, are increasingly likely to incorporate customer authentication data at the POS or during transactions using mobile devices. This will enable electronic transmission to customers, integration into accounts payable (AP) systems, and facilitate their automatic processing.**

It is crucial to clearly differentiate between invoices and receipts (which include payslips and tickets), as both categories play instrumental roles in recording transactions for goods and services. Invoices and receipts generally share similar details, such as the transaction value, applicable sales tax, and discounts.

Examples of 'invoice-like documents and messages' include:

+ Invoice data sent to tax authorities for validation or audit purposes, covering electronic reporting and VAT/Sales tax filings.
+ Digital counterparts to conventional fiscal printers that produce payment receipts, including electronic receipts generated at points of sale (e.g., retail stores, dining establishments, ticket counters) and submitted to tax authorities for validation or audits, especially in regions like Taiwan and certain Latin American countries.

The projection that electronic Point of Sale (POS) systems and mobile invoicing will become increasingly prevalent is supported by several factors. These technologies enhance convenience for consumers and play a critical role for businesses in managing transactions at the POS (including business meals, office supplies, and fuel for company vehicles) and enabling purchases via mobile apps (e.g., for train and flight tickets, parking fees). Moreover, tax authorities are progressively requiring customer authentication for even minor transactions, integrating such data into payment confirmations. This shift is crucial for businesses to accurately reclaim taxes or allocate these expenditures within their accounting systems. The move from traditionally anonymous transactions to digital invoices facilitates their seamless integration and processing within customer systems. This is why in the future it will be less and less possible to differentiate between classic e-invoices and personalized e-receipts in a global context.

### 2.1.3 E-invoicing versus E-reporting

Although invoice-relevant data can be exchanged using the same technical platforms, and following the same schemes and models, it is useful to distinguish between e-invoicing and e-reporting to tax authorities. Mainly in African and Asian publications, e-reporting from cash registers and virtual printers to tax authorities is often translated into English using the term ‘e-invoicing’. However, we use the term differently in this document.

**E-invoicing**: Both the supplier and the buyer have finally an electronic invoice that represents for tax purposes the invoice original. These invoices include the full content. In practice, it may be one document, or several documents, one of which contains all the core information relevant for tax purposes, with separate extensions that are more relevant to suppliers and buyers.

In several jurisdictions, tax authorities mandate that suppliers utilize specific invoice numbers (termed 'folio') they issue. Subsequent to generating these invoices, suppliers in certain regions are obligated to submit comprehensive invoice details to the tax authorities and, either directly or indirectly, to the purchasers. In some cases, tax authorities demand this information prior to the dispatch of goods. The tax authority or certified service providers then scrutinize the data, providing suppliers with electronic validation codes as confirmation.

**E-reporting** to tax authorities: E-reporting includes reports of business transactions, extracts of invoices, declarations of any other fiscal data, and tax records. It is devised to speed up processing of tax statements and returns. In one application example, only the supplier has finally an electronic invoice, but sends the original invoice in paper form to the buyer. In another scenario, the parties exchange just an extract of the invoice electronically (which is suitable for reporting and tax audit purposes).

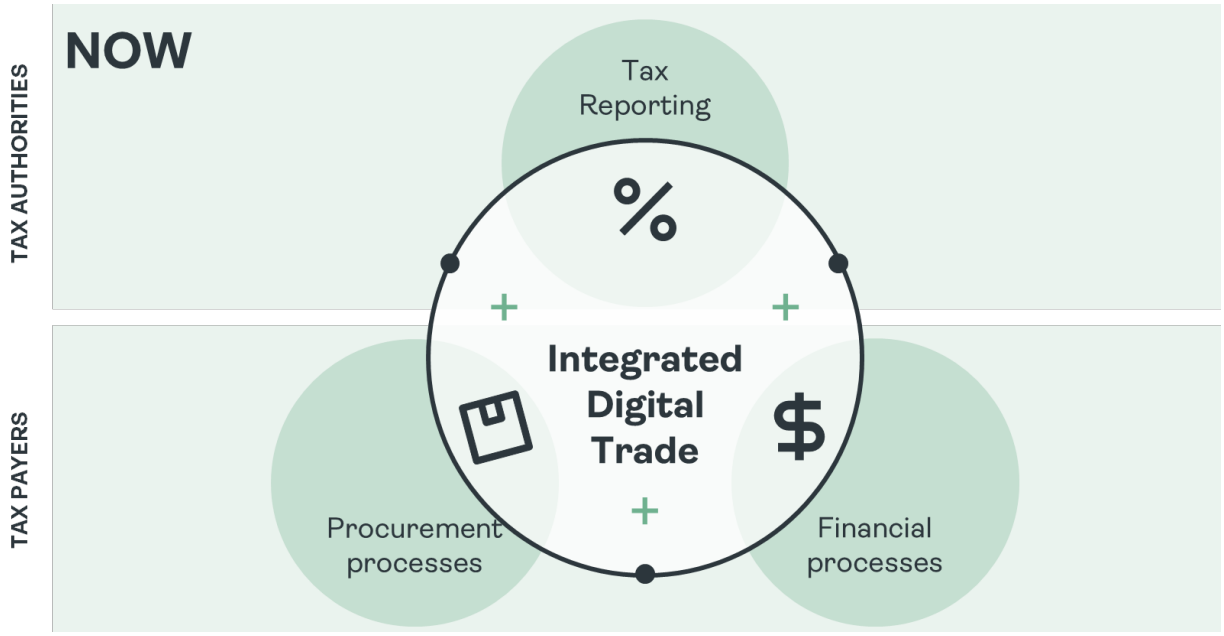
Certain countries mandate the submission of invoice summaries in any format or specifically as the Standard Audit File for Tax (SAF-T). In addition to invoicing details, suppliers are obliged to disclose additional data of fiscal significance.

### 2.1.4 From E-invoicing to Integrated Digital Trade

In nations with Value-Added Tax (VAT) frameworks, invoices are paramount among all business communications. Valid invoices are essential for the reclaiming of VAT and the consideration of purchasing costs in financial accounting. Consequently, the emergence and sustained relevance of terms such as ‘e-invoicing’ and ‘e-billing’ were natural developments, further solidified by legal definitions. Historically, many solution providers specialized exclusively in e-invoicing functionality, yet the demand has grown for support across a broader spectrum of messages within both the financial and physical supply chains. Notably, messages pertaining to electronic tax reporting are often directly associated or, ideally, synonymous with these business communications. In the context of digitalization, e-invoicing constitutes merely a segment of a comprehensive landscape, necessitating an integrated approach to leverage its full potential.

The automation of procurement processes, financial processes and tax reporting has historically progressed with a degree of independence. At its least effective, this segmentation results in isolated processes and data silos. However, the private sector has made strides in automating the financial and physical supply chains, evidenced by the exchange of up to 160 different types of electronic business messages between suppliers and buyers.

Notably, tax authorities in Asia, Latin America, and increasingly in Europe, mandate the submission of electronic data mirroring the business communications transacted between suppliers and buyers.




The convergence of these three domains is progressively evident. Despite their individual evolutions, processes and communications between trading parties and tax authorities often proceed in parallel. A harmonized approach to digitalization is achievable only through collaborative efforts among suppliers, buyers, and tax authorities to design and implement a unified model, paving the way for Integrated Digital Trade.

**This shift signifies the emergence of a new market segment, termed Integrated Digital Trade, transcending previous definitions such as Financial Supply Chain, EDI, Order-to-Cash, Procure-to-Pay, and Business Automation. This segment represents a holistic approach to digitally facilitated trade, underscoring the evolving landscape of tax compliance and administration.**

### 2.1.5 How Tax Authorities Drive Integrated Digital Trade

This comprehensive strategy is primarily propelled by tax authorities, aiming to combat tax evasion through extensive data collection. This method embraces the Big Data concept, focusing on gathering critical data on all pertinent matters. Currently, the universal practice involves the acquisition of general ledgers and other audit-related data, which, in most instances, is mandated only after transactions have concluded. Although paper-based reporting remains prevalent, its impact on curbing tax evasion appears negligible. The exploitation of Big Data is emerging as a pivotal method in the fight against tax evasion.

The pivotal role of invoices, as they furnish tax authorities with the most comprehensive data, marks a significant phase in this transformation. This evolution mandates that organizations exclusively exchange invoices in a digital format, with the obligation to submit these invoices to tax authorities either before or subsequent to goods dispatch, adhering to the Continuous Transaction Control (CTC) model. The employment of e-audit and data forensics techniques enables tax authorities to identify discrepancies more efficiently, leading to a noticeable reduction in tax evasion in several nations.

However, tax evasion avenues still exist, such as through over-the-counter sales or inaccurate declarations of salaries. In response, advanced nations are striving to fully digitalize the communication loop between taxpayers and tax authorities, ensuring that all fiscally relevant data is electronically transmitted. This approach paves the way for real-time or near-real-time audits to become standard practice.

This digital transformation encompasses approximately 25 to 30 fiscal documents, now increasingly required to be electronically exchanged with tax authorities, business partners, and employees. These documents include:

- invoice extracts
- full-content invoices
- POS and mobile invoices
- Corrections, cancellations
- credit/debit notes
- financing
- payments
- purchasing, procurement
- human resources, salary statements
- transport and logistics
- inventory
- export/import documents
- VAT/Sales tax declarations
- bank statements
- etc.

Furthermore, documents and information related to transport, delivery, customs, and manufacturing are anticipated to become integral to electronic reporting. Globally, several countries are advancing towards integrating these practices, although the extent and integration level vary. The EU's Excise Movement and Control System (EMCS) [1], Brazil's pre-shipment

invoicing requirement [2] and Kazakhstan's Virtual Warehouse Module exemplify strides towards merging the virtual and physical tracking of goods [3]. Russia, distinctively, focuses on the traceability of pharmaceuticals to prevent counterfeiting rather than tax evasion.

## 2.2 Tax Driven Continous Transaction Control Models (CTC)

### 2.2.1 Tax Gap as Main Accelerator for Digital Reporting Requirements

Early days of e-invoicing have been pre-dominantly influenced by the private sector seeking to achieve commercial benefits from business automation. Nowadays this has turned into a government driven market development. The main driver for governments to impose new legal and tax related requirements is what is called the VAT/Sales Tax Gap.

The Value Added Tax (VAT) or Sales tax (ST) gap, representing the difference between the expected tax revenue and the amount actually collected, has long been a concern for governments worldwide. As countries grapple with the challenge of combating tax evasion and improving revenue collection, the digitalization of fiscal documents emerges as a potent solution. This way the tax gap serves as a primary catalyst for accelerating the digitalization of fiscal documents.

The digitalization of fiscal documents involves the transition from paper-based records to electronic systems, making use of technology to streamline processes and improve accuracy. In the context of VAT/ST, this means implementing digital platforms for invoicing, reporting, and tax compliance. The inherent benefits of digitalization include real-time data access, reduced administrative burdens, and enhanced traceability, making it a powerful tool in the fight against the VAT/ST gap. This development led to the adoption of Digital Reporting Requirements (DRR).

In countries employing VAT systems, an invoice serves as a crucial document for substantiating tax compliance. Due to historical practices, many of these nations still adhere to Periodic Transaction Controls (post-audit controls), involving tax audits conducted up to several years after transactions occur. This approach presents several drawbacks for both taxpayers and tax authorities, contributing significantly to tax evasion. Consequently, it is deemed outdated. Thus, a swift transition towards real-time or near-time Continuous Transaction Controls (CTC) models is underway. Under this framework, organizations are mandated to report invoices to tax authorities or, at the least, furnish key invoice details electronically. Initially adopted by Latin American, Asian, and select European countries grappling with substantial tax collection challenges, the CTC model is poised to gain global traction, already impacting numerous international businesses. While it may become the prevailing standard, uniform implementation across all nations is unlikely.

**Causes of the VAT/ST Gap and possible digital solutions to bridge the gap**

The VAT/ST gap is a crucial metric that reflects the effectiveness of a tax system in capturing the revenue it is entitled to. This gap arises from various factors, including tax evasion, fraud, administrative errors, and inadequate enforcement. Traditional methods of tracking and collecting tax have proven insufficient, leading governments to seek innovative solutions to bridge the gap and enhance fiscal transparency.

To gain insights into current and prospective digital reporting requirements, it is valuable to scrutinize areas where a tax gap may arise. The subsequent table also delineates digital solutions that possess the potential to substantially mitigate the gap.

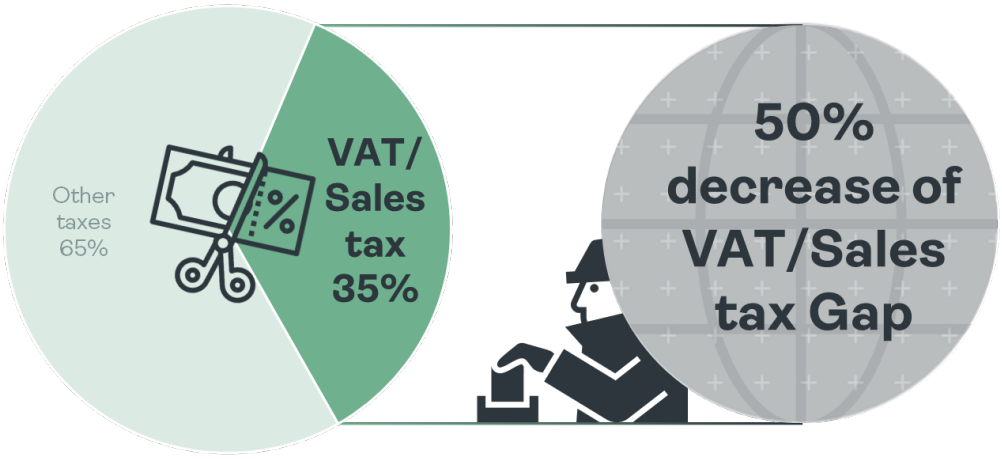
| Cause | Digital solution |
|---|---|
| + Cash payments without receipts and tax declaration | + Require non-cash payments above a certain amount and/or withdraw banknotes from circulation if they exceed a certain amount. |

| Cause | Digital solution |
|---|---|
| | + Require certified cash registers that are linked to the tax authorities to submit real-time reporting.<br>+ Encourage or require customers to demand receipts / invoices.<br>+ Electronic POS and mobile invoicing via CTC models. |
| + Carousel fraud and invoicing between phantom partners, or involved parties winding up before tax audit | + Require e-invoicing.<br>+ Require real-time lookup routines to make sure that all trading parties are registered in the national business directory.<br>+ Apply CTC models. |
| + Invoicing using wrong amounts | + Require e-invoicing via CTC models.<br>+ Artificial intelligence to detect wrong amounts. |
| + Goods are not supplied after an invoice has been issued | + For physical supplies: Digital link between the virtual and physical world; transport documents shall be valid only with evidence that transported goods have been declared with the tax authorities. Digital inventory reporting between businesses and tax authorities. |
| + Undeclared supplies and barter transactions | + Artificial intelligence; match between invoices, labour costs and inventory |
| + Smuggling and domestic fraud with physical supplies | + E-customs; digital trade facilitation; digital link between the virtual and physical world. |
| + Fictive employees and wrong labour costs | + Require electronic salary statements, which are exchanged using CTC models. |

**The impact of the VAT/ST Gap**

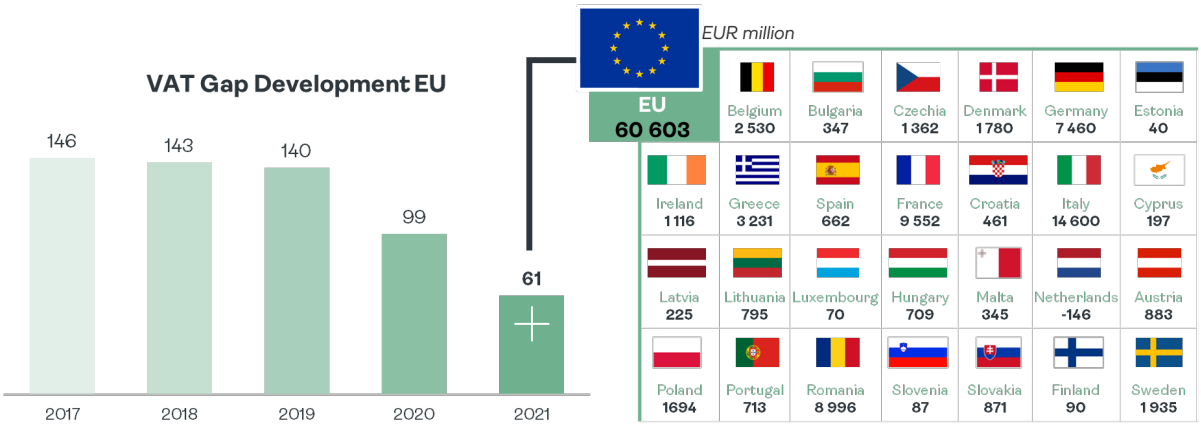
To understand the development of e-invoicing in general, and the influence of the governments in particular, it may be helpful to understand the impact of the VAT/ST gap. Obviously, the economic impact of the VAT/ST Gap can vary significantly depending on the region, the size of the informal economy, the effectiveness of tax administration, and other factors.

The impact becomes very apparent looking at two key figures: The percentage of VAT/ST compared with the overall tax revenue and the actual gap that appears globally.




On a global scale, Value Added Tax (VAT) and Sales tax collectively account for approximately 34% of a country's overall tax revenue, making them the most significant taxes in nearly every nation.

The latest available data reveals a tax gap ranging from 20% to 30% of public revenue, which can be reduced by 50% by introducing tax compliance schemes. More recent figures from the European Commission highlight a notable decrease in the VAT gap over the past few years [4]. However, it is essential to note that this reduction is not indicative of a global improvement in tax collection but is primarily attributed to the economic downturn caused by the COVID-19 pandemic and the departure of the United Kingdom from the European Union, a significant economic player.




However, the evolution of the VAT gap in Italy indicates potential enhancements stemming from the implementation of Digital Reporting Requirements. Italy, as the inaugural European Union member state to adopt such prerequisites, has realized an annual increase in revenue amounting to approximately €6 billion.

Similar positive outcomes have been observed in Latin American nations:

+ Brazil experienced a noteworthy $58 billion (USD) surge in tax revenue by addressing gaps in invoicing and reporting.
+ Chile and Mexico successfully reduced their VAT gap by up to 50% [5].
+ Colombia achieved a 50% reduction in tax evasion through the application of similar models.

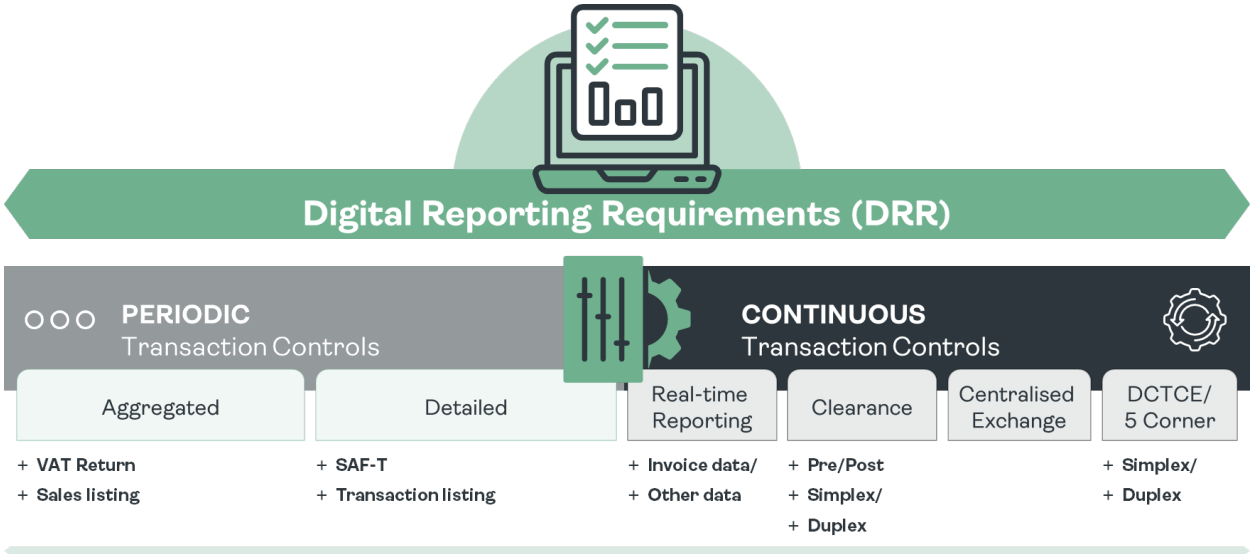
Drawing upon the insights garnered from Austria's case, billentis conducted a comprehensive analysis to compare the advantages of implementing a Decentralized Continuous Transaction

Controls (DCTCE/five-corner) model versus natural market evolution. This investigation underscored that the economic gains for a nation adopting this model could be 5 to 11 times greater than the incremental VAT/ST revenue, attributable to efficiencies gained through business process automation among trading entities.

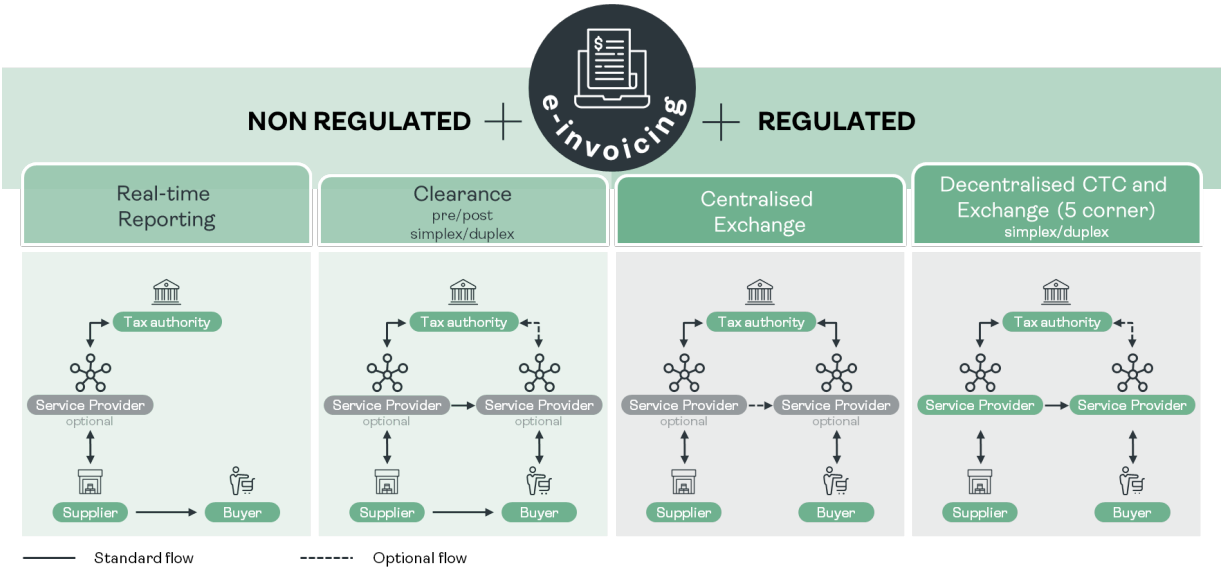
Countries embarking on this journey now have the distinct advantage of leveraging the valuable insights and experiences from trailblazing nations. This enables them to strategize from a comprehensive, top-down approach, engage in early collaboration with the private sector, and afford adequate preparation time for the private sector to effectively implement the model.

### 2.2.2 From Periodic to Continous Transaction Controls

Over the last few years and decades, the process of how taxpayers have to submit their data to the tax authorities has changed massively. The way in which VAT and other indirect taxes are transmitted is now also referred to as Digital Reporting Requirement (DRR). In turn, the trend has clearly developed from Periodic Transaction Controls (PCT), such as the SAF-T standard or traditional VAT Return, in the direction of Continuous Transaction Controls (CTC). The main advantage for the tax authorities here is the faster availability of data and thus additional opportunities to rule out any VAT/Sales tax fraud as effectively as possible.

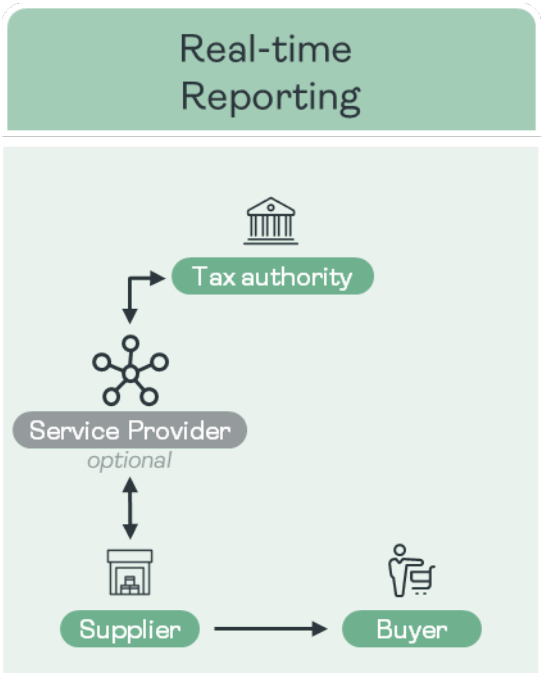



Starting from 2005 different models in different shapes and forms have developed and still exist within the marketplace [6]: Real-time Reporting, Clearance and Centralised Exchange. Based on initial experience, however, a model has now been developed that not only considers the benefits for the public sector, but also allows companies to equally benefit from optimized business processes. This latest generation model is known as the Decentralized CTC and Exchange model (5 corner) and is the basis for the planned introduction in France and the United Arab Emirates, for example.




### 2.2.3 Real-time Reporting Model

Under this model, taxpayers are required to promptly report invoices to the tax administration or its designated government agency. This reporting occurs shortly after the issuance and exchange of invoices between trading parties.




The framework of this model encompasses several key features aimed at streamlining the reporting process. Firstly, there is the establishment of a central processing platform by the tax administration. Secondly, the model mandates the utilization of accredited software solutions for access and processing on the platform. Thirdly, taxpayers are expected to submit either the entire invoice or a subset of invoice data within a specified timeframe of 24-72 hours post-invoice issuance, with flexible frequency intervals. Lastly, the system allows flexibility in the submitted dataset, enabling it to be generated fully from data within the invoice or requiring additional data not present in the invoice.

Beyond adherence to fiscal rules, the model recognizes the diverse landscape of invoicing practices. While invoicing is often not extensively regulated, economic operators may employ formatted electronic invoices or, more commonly, opt for humanly readable representations such as PDFs or traditional paper. The encouragement of e-invoicing is underscored by its potential for enhancing economic efficiency.

The adoption of this model poses unique challenges for taxpayers. It necessitates the implementation of distinct solutions and processes. Real-time reporting requires a separate system from that used for invoicing and/or e-invoicing. Additionally, the inclusion of data beyond the typical invoice content, such as financial accounting data, elevates both the initial investment cost and ongoing maintenance expenses.

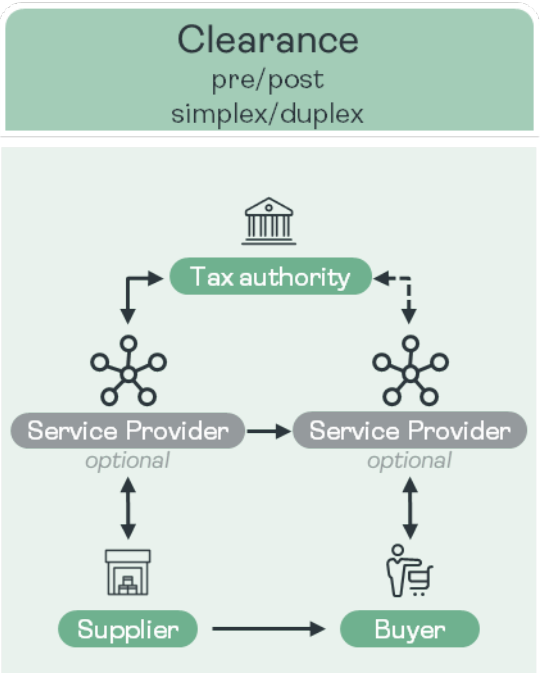
While the model presents a significant stride toward modernizing tax reporting processes, stakeholders must carefully navigate the challenges associated with its implementation. Balancing the benefits of enhanced transparency and efficiency against the investment costs will be crucial for widespread acceptance and success.

Countries exemplifying this model include Hungary and South Korea.

### 2.2.4 Clearance Model

This framework streamlines the process of managing invoices, which includes checking for tax compliance and getting approvals before the invoice is sent to the purchaser. The framework is implemented in various configurations:

+ **Pre-Clearance and Post-Clearance**: Predominantly, invoices are submitted to the platform prior to being sent to the recipient, a procedure known as pre-clearance. Alternatively, some models involve submission post-approval by tax authorities, referred to as post-clearance.
+ **Simplex and duplex:** The simplex model involves solely the issuer of the invoice reporting to the platform. In contrast, the duplex model necessitates both the issuer and the recipient uploading the invoice to the platform.




The process can be conducted through a single, centralized platform or by connecting with various authorized service providers. Invoices and related documents are exchanged directly among businesses or individuals, with or without the aid of service providers. It's notable that these activities aren't governed by government regulations.
A central feature of this arrangement is the creation of a main data storage and a platform by the tax authority. This authority requires taxpayers to use a specific, structured format for their invoices when reporting to the platform. Under this arrangement, the issuer of the invoice must first send it to the designated platform, which houses the main data storage, to get approval. This step verifies the tax compliance of the document. After approval, the issuer can send the approved invoice to the recipient. In a two-way version of this model (duplex), the recipient verifies the invoice on the same platform before payment. It's important to understand that these steps might change if the approval process is handled by authorized external providers.

There are various challenges and concerns for taxpayers in this system. First, the format required for approval doesn't set a standard for all invoices but is specifically designed for the Revenue Authority's requirements. Furthermore, there isn't an automatic way for businesses, like buyers and sellers, to work together smoothly, often leading to the use of different methods for exchanging documents.

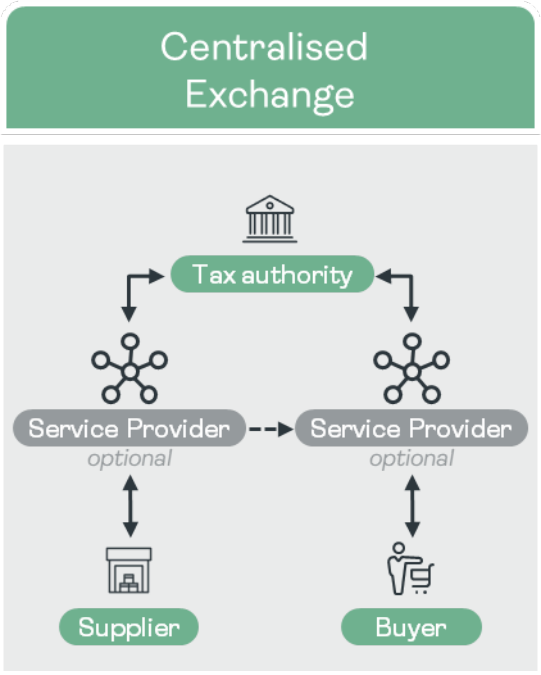
Additionally, this model doesn't inherently improve the automation of managing accounts receivable and payable. To gain benefits beyond tax-related ones, it needs to be part of broader digital initiatives, including adopting electronic invoicing. From a business perspective, this process places significant operational burdens, particularly on the party issuing the invoice. As a result, this model is increasingly being replaced by more centralized or decentralized trading systems.

Countries exemplifying this model include Chile and Mexico.

### 2.2.5 Centralised Exchange Model

The Centralized Exchange model in e-invoicing designates a framework where a pivotal platform or exchange facilitates the transfer of electronic invoices between buyers and sellers,

concurrently incorporating tax reporting features. This model is applicable for both Business-to-Government (B2G) and Business-to-Business (B2B) transactions.




Within this paradigm, a central entity or platform operates as an intermediary among diverse business entities. Its primary responsibilities encompass the reception, processing, and transmission of invoice data, often requiring a uniform invoice format.

Vendors transmit their digital invoices to the central exchange platform through various methodologies, including direct upload, API integration, email, or third-party service providers. Upon receipt, the central exchange conducts a series of examinations, ensuring the invoice's format validity, tax regulation compliance, and adherence to specific business rules. Subsequent to these validations, the invoice is then relayed to the designated buyer, who may retrieve it via the platform through different channels or through service providers.

However, this model presents certain challenges. The reliance on a singular platform may lead to risks associated with system downtimes or potential monopolistic dominance. Businesses must also modify their systems for integration with the central exchange, including aligning with a data format that primarily serves the needs of tax authorities. This necessitates the risk of creating separate workflows between sellers and buyers to facilitate business automation and circumvent the constraints imposed by the invoice format. Furthermore, the model disrupts the trade cycle automation, as invoice processing occurs through the central platform, whereas other documents like orders or dispatch advices are managed directly between trading parties or their service providers.

Countries exemplifying this model include Italy, Serbia, and Turkey.

### 2.2.6 Decentralised CTC and Exchange Model (5 corner)

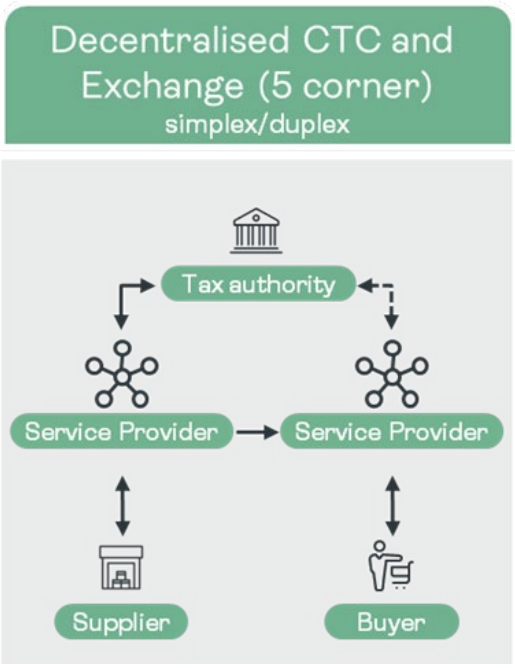
Recently, a new model has emerged that satisfies both the fiscal demands of tax authorities and the requirements for business automation: the Decentralised CTC and Exchange model. This model distinguishes itself by having data validation and exchange conducted by certified service providers, unlike other models. For certification, these providers must comply with a minimum set of technical and financial standards.

The primary document flow is managed between service providers using an established interoperability standard. A selected portion of the invoice, or possibly other business documents, is extracted and reported to the central tax authority platform using a specific standard. This data subset is transmitted immediately after the issuance of the business document, facilitating an uninterrupted trade cycle. Only certified service providers (referred to as corner two and three) have access to the tax authority platform, which serves as corner five.

Both sellers and buyers interact with their chosen service provider through a single, individual interface. This approach enables businesses to capitalize on their existing investments in e-invoicing and trade cycle automation technologies.

Additionally, the model is available in both simplex and duplex versions. In the simplex version, only sellers are required to report to the platform, whereas in the duplex version, buyers also need to report the received business documents.

The primary advantages of the five-corner model include:




+ **Modular Deployment**: The model's various flows can be implemented in stages. The initial focus typically lies on the compulsory B2B and B2G exchange of business documents, utilizing the advantages of business automation. Once this is established and deployed, a separate flow between the certified service providers and the central platform can be introduced with minimal impact on business partners.

+ **Tax Control Customization**: Different countries may have varying requirements for the data they need under a tax reporting scheme. This might include different invoice data sets or additional trade cycle documents. In every scenario, only a subset of the document is used, ensuring data confidentiality and minimization. Changes in requirements do not impact the economic operators as the extraction is managed by the certified service providers.

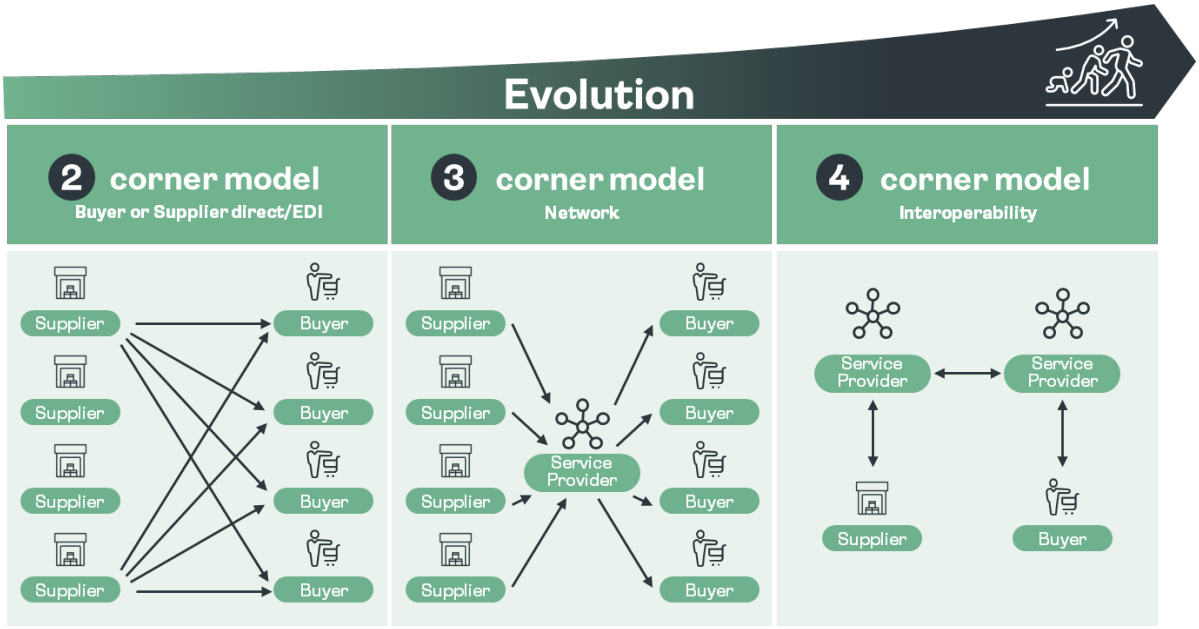
+ **SME Friendly**: Considering the prevalence of SMEs in many countries, these models often incorporate low-cost or complimentary services mandated for service providers as part of the certification process. This typically relates to a specific number of invoices (e.g., up to 50 invoices per year) and is contingent on the company's size.

+ **No Single Point of Failure**: The main exchange of business documents occurs between certified service providers. The central platform receives only a minimal data set, once data quality and compliance are assured. Consequently, the platform only has to maintain and support a limited number of interfaces.

**These findings have significantly propelled interest among a wide range of nations towards adopting the Continuous Transaction Controls (CTC) framework, particularly the 5-corner model, in pursuit of achieving similar economic benefits. Consequently, it is anticipated that numerous countries worldwide will have established the 5-corner CTC model by 2030.**

## 2.3 Private Exchange Models

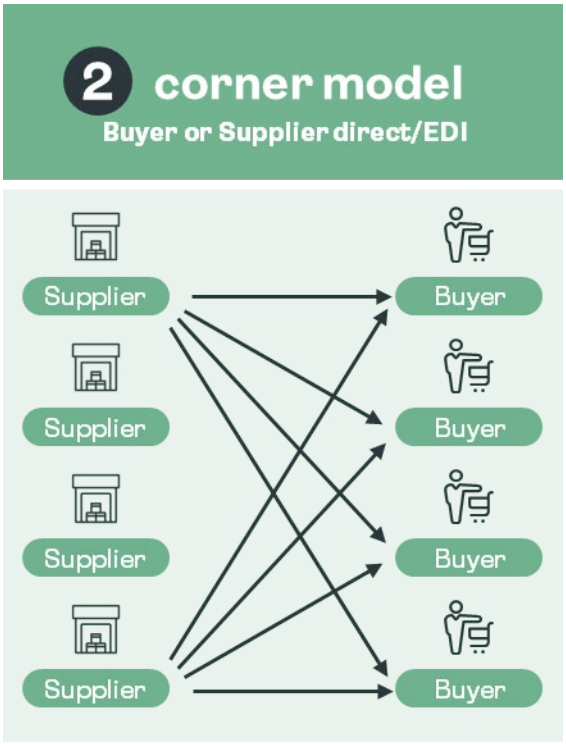
Next to tax driven models there exist private exchange models that can be offered by service providers or used by companies in order to exchange business documents with their trading partners. Starting from early days of e-invoicing until today, there is a clear evolution of models in B2B/B2G beginning with two corner models up to four corner models.




The main advantage for companies to use e-invoicing or Integrated Digital Trade is business efficiency and cost savings. Obviously for end users the focus is rather on automated payment transactions and avoiding the usage of different portals. As payment (and also financing) is getting more and more aligned with e-invoicing, related models emerge in the area of B2C.

### 2.3.1 2 Corner Model (Buyer or Supplier direct/EDI)

A **purchaser** incorporates an electronic invoicing and/or invoice management solution into their operational framework to receive electronic invoices through various channels:




+ Receives invoices directly as a data stream for seamless integration into their Accounts Payable (AP) solution, primarily preferred for invoices from major suppliers.
+ Smaller suppliers input invoice data into a web template on the buyer's corporate invoice portal (webEDI). This data can be automatically processed and imported into the AP system.

This model is favored by larger organizations with a limited supplier base. It can also prove effective for smaller suppliers when electronic orders are exclusively transmitted to them (e.g., via an extranet portal). Numerous solution providers offer functionality to easily convert these electronic purchase order data into invoices for submission back to the buyer.

On the supplier side, an entity implements an e-billing/e-invoicing solution within its environment to disseminate electronic invoices through various channels:

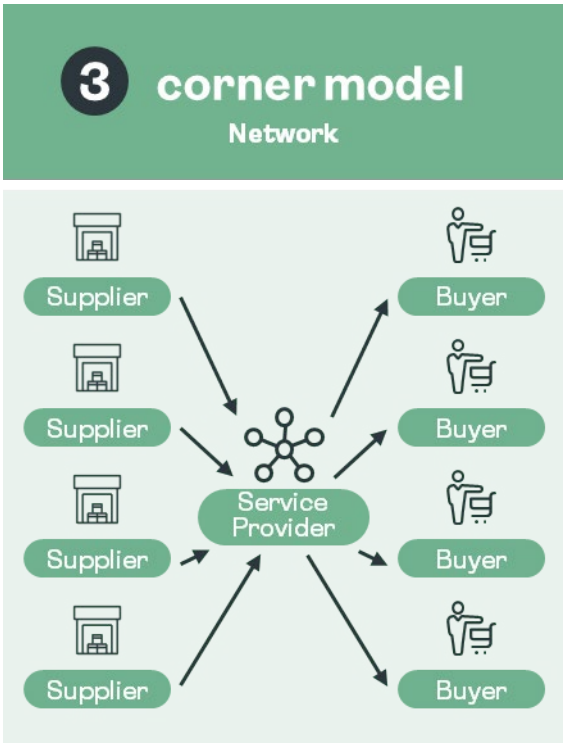
+ Sends invoices to customers via email, Apps, etc.
+ Provides e-invoices on its customer portal, allowing customers to log in, view, and download them.

The **supplier** direct model is particularly popular in high-volume industries such as telecommunications, utilities, card companies, and online shopping portals. Small businesses also prefer exchanging e-invoices directly with their trading partners. Due to their scale, these businesses may lack the capacity to host e-invoices on their own portals, opting instead to exchange them as PDF attachments to emails.

Over time, large organizations employing biller or buyer direct models have found that the marketing rollout is more challenging than anticipated, and the maintenance of their applications is ultimately too costly. Consequently, some service providers offer white-label services, operating under Software as a Service (SaaS) or Platform as a Service (PaaS) models. These providers manage the direct model on behalf of large issuers and recipients of invoices, handling software development, maintenance, and operations. Customers pay a fixed integration fee along with a volume- or time-based fee.

### 2.3.2 3 Corner Model (network)

The three-Corner Model emerges as a comprehensive framework for orchestrating e-invoicing processes among buyers, suppliers, and service providers. This model delineates the interactions and responsibilities of these three key entities within the e-invoicing landscape, offering a structured approach to facilitate seamless and secure electronic document exchange.



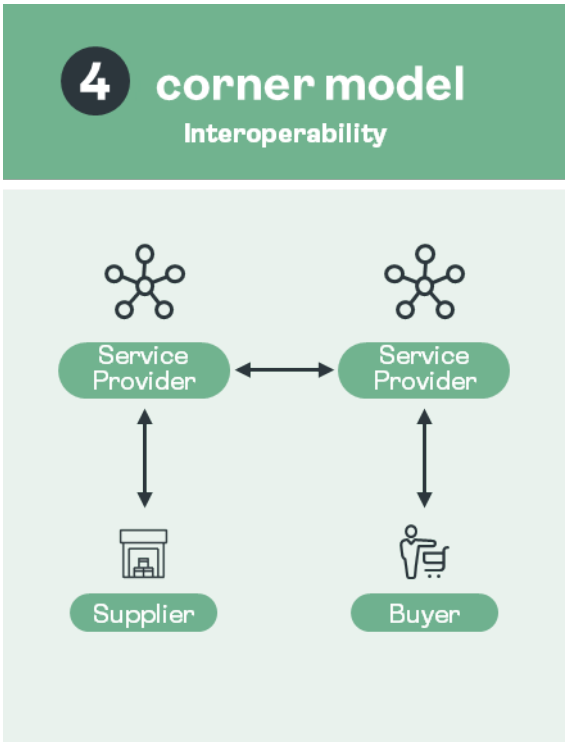

The **first corner** of the model represents the buyer, where initiation and reception of e-invoices take place. By leveraging a single interface to the service provider based on a defined data format and communication protocol, buyers can seamlessly integrate e-invoicing into their procurement systems, automating the invoice approval workflow and expediting payment processes. This happens regardless of how suppliers transfer their documents to the service provider. Central databases are usually used to ensure that incoming documents in various formats (PDF, XML, portals, etc.) are converted into the data format agreed with the recipient. Increasingly, the necessary data is extracted using Artificial Intelligence, meaning that traditional document scanning or data mapping is no longer required.

The **second corner** focuses on the supplier, responsible for generating and delivering e-invoices. The model emphasizes the importance of compliance with established e-invoicing standards, ensuring uniformity and interoperability across diverse business ecosystems. Based on one single interface to the service provider the model still caters for individual requirements imposed by large buyers. Suppliers benefit from reduced processing times, increased accuracy, and improved cash flow management through the adoption of the Three-Corner Model.

The **third corner** introduces service providers, acting as facilitators in the e-invoicing process. These entities play a crucial role in offering e-invoicing solutions, such as platforms for invoice creation, validation, and transmission. Intermediaries contribute to the scalability of e-invoicing adoption by providing a bridge between diverse systems and ensuring a smooth exchange of electronic documents. The service provider supports the main legal requirements, authenticity, and the end-to-end data integrity. An increasing number of operators offer additional services such as tax compliant long-term archiving.

### 2.3.3 4 Corner Model (Interoperability)

The four-corner model operates as an exchange framework facilitating the transmission of invoice messages, with distinct service providers supporting both the sender and the receiver. This model can be viewed as an extension of the two and three-corner models, where service providers of the former models connect to each other, resulting in the establishment of a four-corner model.




A notable advantage of the four-corner model lies in affording flexibility to both buyers and suppliers in selecting their preferred service providers. Simultaneously, it broadens the reach for each service provider and their customers, as engaging with an additional service provider can expand the electronic business partner network for a company.

To enable interoperability within a four-corner model, service providers must reach consensus on various standards, including legal agreements, service level agreements, data formats, protocols, and potentially commercial agreements. Such agreements can be bilateral or based on international standards. Currently, three prominent global associations—GENA (Global Exchange Network Association), OpenPeppol, and DBNA (Digital Business Networks Alliance), the latter recently started operations — are instrumental in setting these standards. The adoption of international standards streamlines the process, allowing seamless access to the entire customer base of another service provider through a single interface, whereas bilateral agreements may entail individualized setups for each customer.

As the global trend towards e-invoicing implementation continues, a surge in companies adopting these solutions is anticipated. This necessitates a value proposition focused on reducing complexity, consequently saving time and costs associated with achieving business process interoperability among trading partners. In response to this, OpenPeppol and GENA have initiated a collaborative incubation project to harmonize their existing interoperability frameworks, creating a unified framework for seamless business cooperation.

The Global Interoperability Forum (GIF) extends the concept of interoperability between diverse frameworks, including associations such as DBNA and ConnectONCE in the United States. This collaborative effort aims to establish common standards, fostering a more cohesive and efficient global business environment.

### 2.3.4 Consumer Driven E-invoicing Models

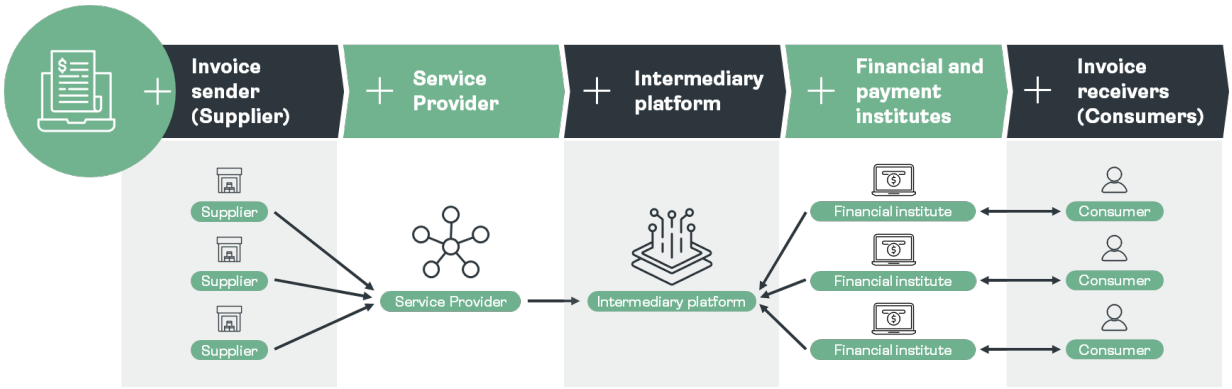
The various two, three, and four corner models are evidently well-suited for processing consumer (B2C) invoices as well. However, the advantages of employing electronic invoices for consumers differ significantly from those in B2B or B2G contexts. Rather than navigating diverse IT systems for invoice processing, consumers prioritize a convenient method for making payments and managing their invoices. The same principle applies to the receipt and storage of invoices, leading consumers to seek streamlined processes and avoid downloading or receiving invoices from disparate sources.

In response to these consumer-centric requirements, additional B2C models have emerged that closely integrate the e-invoicing process with payments, invariably involving payment and

financial institutions. The role of these supplementary intermediaries is to bridge the gap between invoice senders and end users by incorporating information about the end user's bank account, which is typically not available to the sending party.

This process typically encompasses the following components:

+ Access to the intermediary platform for invoice senders is restricted to certified service providers.
+ End users receive e-invoices through existing Online Banking solutions to adhere to security and accessibility requirements.
+ Payments are facilitated without the need for re-entering payment information, leveraging the existing Online Banking process.




Comparable solutions have been deployed in Finland, Belgium, and Switzerland. The integration of the upcoming Request-to-Pay scheme by the European Payments Council into the solution remains uncertain. It is yet to be determined whether the new scheme possesses the capacity to supplant existing models.

The imposition of B2C mandates for e-invoicing is anticipated to influence the model. In an optimal scenario, this model could potentially be connected to a centralized tax administration platform, facilitating the seamless onboarding of B2C transactions.

## 2.4 Supporting Associations and Initiatives

### 2.4.1 Global E-invoicing Associations

#### 2.4.1.1 Global Exchange Network Association (GENA)

The Global Exchange Network Association (GENA), initially established as the European E-invoicing Service Providers Association (EESPA), is an international trade association that focuses on the digital exchange of data and documents related to business transactions. GENA's transformation from EESPA to its current form occurred in October 2023, reflecting a shift from a European to a global focus establishing local chapters in different regions worldwide. The organization aims to develop best industry practices and influence public policy, particularly in the realm of electronic invoicing.

GENA comprises over 100 member organizations, including service providers from various sectors such as network services, business outsourcing, financial services, technology, and Electronic Data Interchange (EDI) services. These members create a vibrant, competitive market, and do so by collaboration in the non-competitive space, striving to develop common standards and best practices. GENA provides a platform for its members to engage in networking, sharing knowledge, and developing interoperable systems for efficient electronic invoicing and data exchange.

The association's activities revolve around three main pillars: influencing business efficiency and innovation, informing members and the public about e-invoicing and related issues, and

facilitating interaction and cooperation among members. GENA's governance structure includes an Executive Committee and various working groups focusing on interoperability, public policy, compliance, and other key areas.

Overall, GENA plays a critical role in advancing the efficiency and standardization of electronic invoicing and business document exchange on a global scale.

#### 2.4.1.2 OpenPeppol

OpenPeppol is an organization that was established in 2012 to support the expansion and adoption of the Peppol specifications. These specifications were initially developed as part of a large-scale project funded by the European Commission to facilitate electronic procurement and invoicing processes across different European countries. The main goals of OpenPeppol and the Peppol specifications are:

+ Interoperability: Peppol specifications ensure that different eProcurement and e-invoicing systems can communicate with each other globally. This interoperability is crucial for efficient domestic and cross-border transactions.

+ Standardization: By standardizing the formats and protocols for electronic procurement documents (like invoices, purchase orders, etc.), Peppol simplifies the process of electronic transactions between businesses, and between businesses and governments.

+ Connectivity: Peppol provides a network (known as the Peppol Network) that enables the secure exchange of business documents. This network is supported by Peppol Access Points, which are service providers that connect users to the Peppol Network.

+ Governance: the OpenPeppol legal and compliance framework ensures that the Peppol specifications and Peppol Network facilitate a trusted and secure implementation of eProcurement and e-invoicing processes across different jurisdictions.

Beyond electronic invoicing, Peppol is increasingly relevant for the exchange of other electronic business documents, such as tax reporting, logistics, catalogues, and procurement. With the growing emphasis on digital transformation globally, the role of OpenPeppol in standardizing and promoting electronic business document exchange is increasingly important in the B2B and B2G sectors.

#### 2.4.1.3 Digital Business Networks Alliance (DBNA)

The Digital Business Networks Alliance (DBNA) is an initiative aimed at enhancing the electronic exchange of business documents, particularly e-invoices, in the United States. Established in 2023, it represents a significant effort to address the challenges and inefficiencies associated with the B2B payments industry in the country, which has been heavily reliant on manual processes.

The core mission of the DBNA is to create a secure and standardized electronic delivery network for the safe exchange of business information, including e-invoices and supply chain documents. This is achieved through an exchange framework that the DBNA oversees. This framework is designed to standardize how businesses connect, what information they send, and how they electronically deliver this information.

One of the key features of the DBNA's exchange network is its support for a variety of electronic payment methods, such as instant payments, ACH, wire transfers, and card payments. This network is developed to resolve issues arising from the lack of a centralized system for sharing supply chain documents in the U.S. It ensures secure information sharing between businesses, even if they use different software systems.

The DBNA uses a Four-Corner Model for its exchange framework, which means that e-documents are received through an Access Point service provider that connects the network to its users. Once connected, users can securely exchange electronic invoices and other electronic supply chain documents. The communication protocol used on the network is AS4.

This initiative was tested through a pilot project implemented in three stages throughout 2022, which went into production and is available to all U.S. businesses since January 2024.

### 2.4.2 E-invoicing Initiatives

#### 2.4.2.1 Relevant Global E-invoicing Initiatives

In the meantime, e-invoicing is reflected in almost every organisation or initiative that is related to trade and commerce. For example, it became a topic in bi- and multilateral trade negotiations like the Indo-Pacific Economic Framework (IPEF), the EU-US Trade and Technology Council (TTC) and the Digital Trade Agreement negotiations between EU and Singapore/Republic of Korea/Japan.

The **OECD's international VAT policy dialogue** encompasses discussions on various aspects of VAT, including digital reporting and e-invoicing. The organization seeks to promote international cooperation, standardization, and best practices to ensure that VAT systems are efficient, transparent, and adapted to the challenges posed by digitalization in the modern economy. This helps countries harmonize their tax policies and facilitate cross-border trade while maintaining effective tax collection and compliance.

As part of the **EU-US Trade and Technology Council** in April 2024, e-invoicing has been explicitly mentioned. It underlines the ambition of the two regions to foster interoperability between the different local frameworks, as some differences have been determined. The joined declaration stated the decision to choose a group of experts to continuously work on aligning business and technical interoperability. This work includes the standardisation of the data structure and content as well as the interoperability between service providers.

The primary objective of the **Global Interoperability Forum (GIF)** is to build consensus and demonstrate how the member organizations Business Payments Coalition (BPC), Connect ONCE, Digital Business Networks Alliance (DBNA), Global Exchange Network Association (GENA) and OpenPeppol share a common vision for convergence to the maximum extent possible in the design and delivery of interoperable networks. This vision includes the belief in the power of the four-corner e-delivery model and in its positive impacts on supply chain efficiency for all actors. The GIF will also work to progress architectural alignment between interoperability frameworks and their components.

**GS1**, known for its standards in supply chain management and global data synchronization, also plays a role in the area of e-invoicing. Their activities typically include:

+ Standardization: GS1 develops and promotes standards for electronic invoicing. This includes standardizing the format and content of e-invoices to ensure consistency and interoperability between different systems and organizations.

+ Global Data Synchronization: GS1's Global Data Synchronization Network (GDSN) allows companies to share standardized and synchronized data, including pricing information, which is essential for accurate and efficient e-invoicing.

+ Barcoding and Identification: GS1 is renowned for its barcode standards, which can be used in e-invoicing for product and service identification. This ensures that the items on an invoice can be accurately identified and matched to a product database.

- Electronic Data Interchange (EDI): GS1 supports EDI standards, which are often used for transmitting e-invoices between companies. These standards help streamline the invoicing process and integrate it with other supply chain functions.

- Education and Training: GS1 provides resources, training, and support to businesses implementing e-invoicing. This includes guidelines on best practices and the use of GS1 standards in the invoicing process.

#### 2.4.2.2 VAT in the Digital Age (ViDA)

In general, the European Union (EU) has always been highly supportive seeing e-invoicing and e-procurement as key elements of the Digital Agenda and Single Market. The EU VAT Directive 2006/12/EU, as amended by Directive 2010/45/EU created a harmonized and supportive legal environment for e-invoicing focused on authenticity, integrity, legibility, and archiving. The Directive 2014/55/EU required that public sector contracting entities must be able to receive and process e-invoices.

Now, on the 8th of December 2022 as part of the VAT Directive 2006/112/EC, the European Commission (EC) announced the adoption of a new initiative - VAT in the Digital Age - that demands mandatory intra-community electronic invoicing and business-to-business (B2B) digital reporting [7]. This will require all businesses, without any thresholds or exemptions, to exchange intra-community invoices electronically by 2028 and in parallel fulfil the requirements for tax reporting. Within a ten-year period, the European Commission expects an additional VAT revenue of 111 billion € and savings for businesses of about 41 billion €.

The main elements of ViDA affecting electronic invoicing:

- Once the digital reporting is introduced recapitulative statements or sales lists will no longer be required.
- The definition of an electronic invoice will be changed to specifically make clear that it must have structured data i.e., a standard PDF will not be considered an e-invoice anymore. The required data elements and reporting format for the new intra-EU digital reporting will be based on EN16931, the existing European e-invoicing standard.
- It includes the removal of the buyer consent. An invoice sender no longer needs to ask for the acceptance of electronic invoices by its customers.

An interesting additional aspect of the initiative is, that taxpayers will submit the required transactional data to the relevant national tax authority. Tax authorities will then share data with other member states by reporting it to the European Commission's new central database. This will encourage many countries to analyse their existing e-invoicing regulations and also evaluate the introduction of mandatory e-invoicing for B2B transactions on a national level. As a consequence, all EU countries will have initiated or implemented national tax platforms and mandatory e-invoicing schemes by 2028.

The final approval of the initiative is anticipated to occur by May/June 2024, with a potential deferment of the implementation date to 2030.

### 2.5 The Global Dissemination of Data Format Standards

Numerous standardization initiatives have historically struggled to gain acceptance among stakeholders due to insufficient awareness of existing standards and the reluctance of certain insular organizations to adopt external protocols. This has led to the proliferation of numerous specialized standards with either domestic or industry-specific applications, particularly in recent years. Such standards are likely to sustain only if they adapt to form a subset of widely recognized global standards such as Oasis UBL or UN/CEFACT, or at least conform to a similar foundational model.

In Europe alone, an estimated 10,000 ERP and accounting solutions are currently in operation. The integration of diverse e-invoicing standards generally falls outside the capabilities of ERP providers. Consequently, many e-invoicing network operators have emerged to offer any-to-any data formatting services. These services not only address legal and networking challenges but also significantly contribute to the central role of third-party providers in the e-invoicing sector across various nations. By utilizing such services, both issuers and recipients of invoices are liberated from dependency on any single standard and are no longer constrained by the pace at which a market-dominant standard emerges.

E-invoicing and procurement are critical elements of contemporary business operations, and the development of various international and industry-neutral standards has been central to enhancing these processes. These standards are designed to ensure efficiency, compatibility, and security. Below is an overview of some of the most prominent standards currently in use:

| Standard | Description |
|---|---|
| UBL 2.x<br>ISO/IEC 19845:2015 | Developed by the Organization for the Advancement of Structured Information Standards (OASIS), UBL is a widely accepted standard that provides a complete suite of XML-based business documents, including invoices. UBL, the Universal Business Language, is the product of an international effort to define a royalty-free library of standard electronic XML business documents such as purchase orders and invoices. UBL provides the standards for the Peppol framework and public procurement initiatives in several countries. |
| UN/CEFACT | UN/CEFACT (United Nations Centre for Trade Facilitation and Electronic Business), a United Nations body, has a global remit. It encourages close collaboration between governments and private business to secure interoperability for the exchange of information between the public and private sector. It has developed:<br>+ XML Industry Invoice D.16B, this XML format is widely used for cross-industry digital data interchange.<br>+ Cross Industry Invoice (CII) - This format focuses on generic invoice requirements, suitable for any industry globally.<br>+ The UN Layout Key for Trade Documents, which is the foundation for the EU's Single Administrative Document (SAD)<br>+ Numerous trade facilitation recommendations |
| PDF/A-3<br>ISO 19005-3 | PDF/A is an ISO-standardized version of the Portable Document Format (PDF), tailored specifically for the digital preservation of electronic documents. Unlike standard PDFs, PDF/A eliminates features that are not conducive to long-term archiving, an essential consideration for business documents that must be legally preserved over an extended period.<br><br>PDF/A-3, building on the PDF/A-2 (ISO 19005-2) standard, introduces a critical enhancement allowing the embedding of files in any format, such as XML, within a PDF/A document. This capability is pivotal for integrating non-PDF data within the archival format. |
| European Norm 16931<br>CEN/TC 434 | Directive 2014/55/EU mandated the creation of a European standard for electronic invoicing within public procurement to eliminate cross-border barriers.<br><br>The outputs from the project group encompass a European standard detailing the semantic data model for core components of an |

| | |
|---|---|
| | electronic invoice, along with a technical specification that limits the number of invoice syntaxes and includes additional elements. The two syntax formats endorsed by CEN are UBL and UN/CEFACT.<br><br>This standard is required to be implemented by all EU public administrations. Its architecture accommodates national usage specifications which dictate the mandatory use of certain elements while excluding others. Moreover, it facilitates national or industry-specific modifications. This foundation not only complies with current requirements but also establishes a robust framework for future business-to-business (B2B) applications. |
| CEN/TC 440 | The primary goal of these standards is to enhance and streamline the electronic public procurement processes and the associated informational flows within the physical and financial supply chains. They encompass standardized messages for e-notification, e-tendering, e-ordering, and e-fulfilment. |

Industry specific standards are:

- **ETIS** (Electronic Telecom Invoice Standard): Developed by the ETIS community, it's used for electronic data exchange in telecom invoicing, addressing industry-specific aspects like data roaming and interconnect billing.
- **EANCOM**: A subset of EDIFACT, specialized for retail industry invoicing, providing standards for electronic data interchange in global retail.
- **ISO 20022**: Multi-industry standard for electronic data interchange between financial institutions.
- **LITIG** (Legal IT Innovators Group): Used primarily by law firms for billing clients. It helps standardize the electronic exchange of cost information between law firms and their clients.
- **PIDX** (Petroleum Industry Data Exchange): Developed by the American Petroleum Institute, this format is used globally for all transactional data in the petroleum industry, including electronic invoicing.
- **Rosetta Net**: Uses XML-based messaging to standardize electronic business processes and transactions in the technology, electronic components, and semiconductor industries.
- **HL7** (Health Level Seven International): HL7 CDA (Clinical Document Architecture) for invoicing, which is used for clinical documents but can be adapted for invoicing in healthcare services.
- **ODETTE**: Used for automotive industry invoicing in Europe, facilitating supply chain and logistics operations data exchange.

Some country specific standards are:

- Austria: ebInterface
- Denmark: OIOXML (based on UBL)
- Finland: Finvoice
- Germany: XRechnung, ZUGFeRD
- India: GST INV-1
- Italy: BTW, FatturaPA
- Spain: facturae
- Sweden: Svefaktura, SFTI
- Switzerland: swissDIGIN
- Turkey: UBL-TR (based on UBL)
- USA: ANSI ASC X12 810

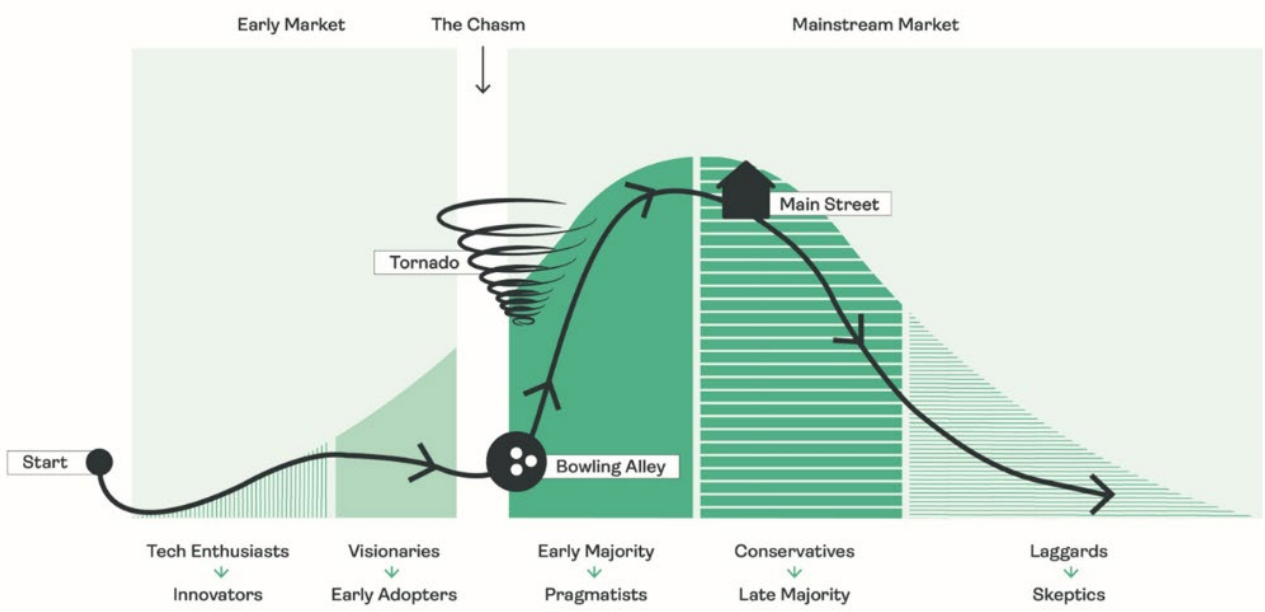
# 3. Market Development and Drivers: Watch the Tornado!

## 3.1 Watch the Tornado!

Current market trends indicate a significant impact resulting from the delayed implementation of new electronic e-invoicing mandates and frameworks on a global scale. The majority of countries have not adhered to their initial timelines for introducing e-invoicing. Despite these delays, it is evident that transformative changes are imminent. This shift, akin to a silent revolution, remains largely unobserved at present but is poised to fundamentally alter the economic landscape.

Consequently, the theme of this report has been inspired by Geoffrey Moore's seminal works, 'Inside the Tornado' and 'Crossing the Chasm', reflecting the anticipated profound and rapid changes in the business environment.

'Inside the Tornado' by Geoffrey Moore is a seminal work in understanding the dynamics of market development for technological innovations. The book extends the concepts introduced in Moore's previous work, 'Crossing the Chasm', and focuses on the stages following the early adoption of technology. Moore outlines a technology adoption life cycle that includes several distinct stages: Innovators, Early Adopters, Early Majority, Late Majority, and Laggards. This cycle forms a bell-curve, starting small with Innovators and peaking at the Early Majority before declining.




The book delves into three major phases of the technology adoption life cycle:

- **The Bowling Alley**: A phase of niche adoption following the chasm, where companies must use their initial customers to attract further niche markets.
- **The Tornado**: This phase occurs when a product gains rapid mainstream acceptance. Companies need to shift strategies drastically here, focusing on mass market appeal and commoditizing their product.
- **Main Street**: After the excitement of the Tornado, demand stabilizes. Companies must then focus on differentiating their commoditized product to appeal to niche markets and individual customers.

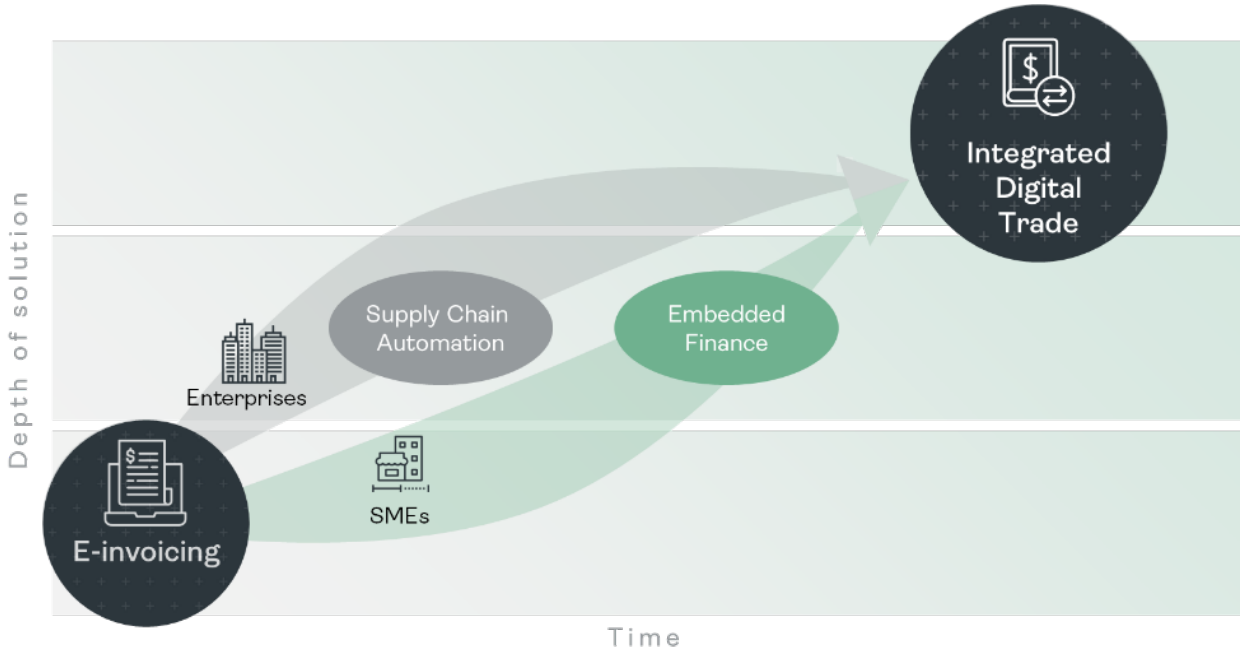
In 2024, the market landscape continues to be shaped by numerous delays, with a limited number of multinational corporations initiating strategic planning in response to expected de-

velopments. Nevertheless, based on numerous upcoming B2B mandates, the electronic invoicing sector is transitioning into a phase of widespread market adoption, referred to as the **'Tornado'** phase.

**This signifies a pivotal shift to a new infrastructural paradigm, necessitating a deep understanding among both service providers and businesses. The anticipated increase in demand underscores the importance for service providers to offer relevant products and services, while businesses must proactively adapt to ensure readiness, often underestimating the requisite changes.**

In parallel to the development of the e-invoicing market, the nascent market for Integrated Digital Trade is on the brink of evolution. Presently in the 'Bowling Alley' phase, as per Moore's concept, it encompasses solutions such as Invoice Finance, Payment, and Procurement. Small and Medium-sized Enterprises (SMEs) and larger corporations are expected to navigate different routes towards embracing Integrated Digital Trade. SMEs, facing fewer transactions than their larger counterparts, may find limited benefit from automation, such as ERP system integration. Instead, SMEs are likely to prioritize integrated solutions focusing on payments or financing to leverage financial gains over automation benefits.

This trajectory is steering SMEs towards the **'Embedded Finance'** market, characterized by the incorporation of financial services within non-financial customer experiences, platforms, or journeys. Embedded finance integrates financial products into daily digital interactions, ranging from digital wallets to e-commerce platforms, most of which are fundamentally financial (e.g., banking, payments, lending, insurance). Originating in the US, where payments significantly drive the market, this segment is predominantly led by various payment providers. The US market for embedded finance is projected to grow from $22 billion in revenue in 2021 to $51 billion by 2026, with embedded B2B payments expected to quadruple from $1.9 billion to $6.7 billion in the same timeframe [8].




Now, the integration of e-invoicing and tax compliance solutions represents an additional significant component of embedded finance. This integration, particularly when embedded within accounting, ERP, or eCommerce solutions, is poised to efficiently serve the SME market by enhancing accounting software capabilities, thus streamlining the reconciliation of payments and invoices.

For larger enterprises, the evolution beyond e-invoicing involves integrating and **automating supply chain** processes, including order and dispatch advisories, which promise greater savings than financial processes alone.

Ultimately, businesses of all sizes will adopt Integrated Digital Trade, merging all discussed processes. Exceptions will exist, such as companies with a significant Business-to-Consumer (B2C) focus prioritizing payment integration or SMEs adopting financial services early due to B2B e-invoicing mandates. Legal mandates will also significantly impact the adoption timeline, especially for SMEs, potentially leading to mass adoption close to mandate introductions.

Additionally, market dynamics such as Environmental, Social, and Governance (ESG) considerations and Artificial Intelligence (AI) are influencing the different market segments. Subsequent sections will delve into these drivers more comprehensively.

### 3.2 Invoice Finance as Key Accelerator of Supply Chain Finance

The International Finance Corporation (IFC), a World Bank affiliate, highlights electronic invoicing as a pivotal technology in Supply Chain Finance (SCF) within its 'Handbook on Technology and Digitization in Supply Chain Finance'. E-invoicing significantly streamlines processing, facilitates immediate triggers for acceptance and financing, and aids in data storage and analysis for understanding sales trends and forecasting future needs.

And indeed, e-invoicing and SCF exhibit a mutually beneficial relationship. E-invoices enable efficient information capture about receivables for financing, often through automated processes. Additionally, e-invoices offer delivery confirmation and buyer response messages, simplifying invoice approval and reducing non-payment risks unrelated to buyer creditworthiness. Automated invoice systems show a higher percentage of on-time payments compared to paper-based systems. 33% of transactions with automated systems are paid on time, while only 24% of paper-based invoices are paid on time [9].

The overall global supply chain finance market is expected to grow from $6 billion in 2021 to $13.4 billion by 2031, at a CAGR of 8.8%. The global split is approximately 55% North America, 24% Europe, 19% Asia and 2% Africa. This growth is being driven by a surge in the acceptance of supply chain finance in emerging economies and an increase in competition in the supply chain finance business, along with new agreements pertaining to the domain of supply chain finance. The integration of advanced technologies like blockchain in online supply chain finance business activities is also creating new opportunities in the market [10]. Still McKinsey estimated that the SCF market only covers around 10% of its full potential. There is still much potential to exploit, in particular in combination with electronic procurement and invoicing.

These figures highlight the dynamic and rapidly expanding nature of the supply chain finance market, reflecting its growing importance in global trade and finance. Currently, two developments will further increase the usage of SCF solutions as they negatively impact the working capital: increasing interest rates and extended late payments. The pandemic has exacerbated late payment issues. In 2020, Italy had about 43.9% of its B2B invoices unpaid with up to 30 days delay, and France recorded a 56% delay in on-time payments. South Africa also experienced a rise in late payments, with 91% of surveyed SMEs affected by late payments, averaging 18 days delay [11].

Suppliers, particularly small and medium-sized enterprises (SMEs), are adversely affected by delayed payments for their goods and services. To mitigate this issue, they are progressively offering discounts to their clients. However, these incentives have limited impact on shortening payment terms, such as a 15-day window to avail discounts, due to the inability of many large invoice recipients to expedite the processing of paper invoices beyond 23-25 days.

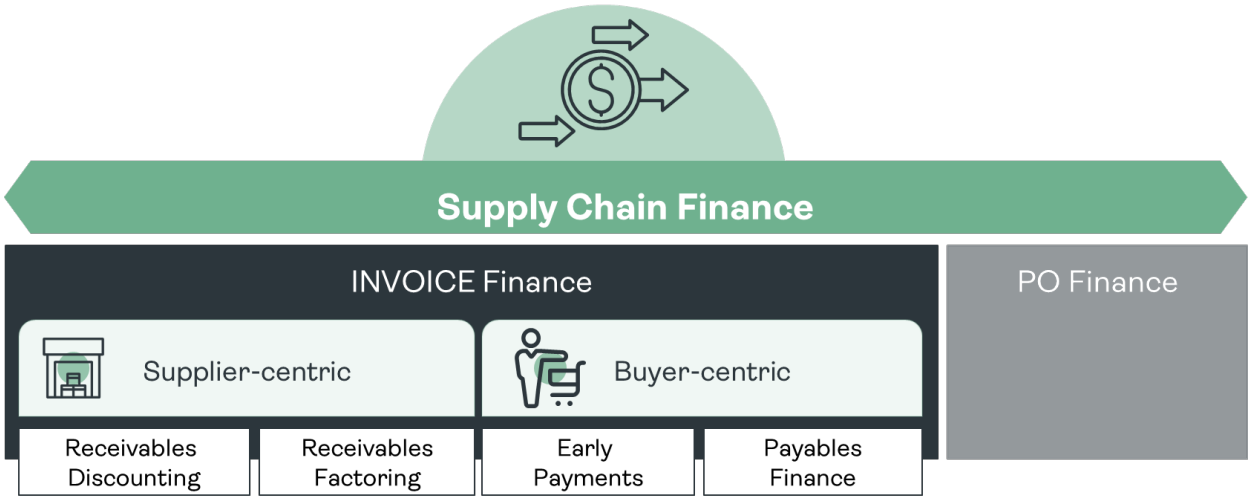
A client reported a loss of discounts amounting to EUR 1.50 per paper invoice. It was observed that the savings accrued from these discounts significantly outweigh the costs and investments associated with implementing electronic invoicing in this specific project.

Invoice Finance, a subset of SCF, leverages financing and risk mitigation to optimize working capital and liquidity in supply chain transactions. SCF techniques, defined by the Global Supply Chain Finance Forum, encompass various domestic and international trade finance methods. Among the eight identified SCF techniques, four are pertinent to invoice finance: Receivables/Invoice Discounting, Factoring, Early Payments and Payables Finance.

The distinction between buyer-centric and supplier-centric SCF models is critical. Suppliers primarily prioritize access to financing, assurance of timely payments, and the security of guaranteed transactions. On the contrary, buyers emphasize optimizing working capital and leveraging discounts to their advantage. It is imperative for providers to offer solutions that cater to the distinct needs of both parties, ensuring these solutions are adaptable and suitable for small enterprises. Additionally, the flexibility to apply these solutions selectively, tailored to individual circumstances, is essential.

In supplier-centric SCF, suppliers directly seek financing, focusing on receivables discounting, factoring, and loans against receivables, with the primary risk being the buyer's payment obligation. Suppliers access credit against receivables due from customers as evidenced by their outstanding invoices. Businesses pay a percentage of the invoice amount to the finance provider as a fee/discount for obtaining the funds.

Conversely, in buyer-centric SCF, buyers collaborate with financiers to enable suppliers to discount receivables, known as Payables Finance or reverse factoring, where the main risk is the buyer's creditworthiness. The major advantage is that is relies on an approved invoice of the buyer which reduces the risk of fraud and disputes.




Regarding the Global Exchange Network Association (GENA), four key areas have been identified where service providers will present solutions [12]. GENA distinguishes the function of a service provider into two distinct roles: 'Activator' and 'Enabler'. In the **activator** capacity, a service provider may offer invoice finance to suppliers, leveraging receivables or invoice discounting. This may involve utilizing their own funding sources or collaborating with a financial partner to provide capital. Typically, this funding is offered on a selective basis or per individual invoice, employing various methods for initiating transactions, such as automated or manual selection.

Conversely, the **enabler** role opens a second category of opportunities for service providers in invoice finance, encompassing three areas: factoring, early payment discounts, and payables finance. In this role, a service provider might collaborate with a factoring company to facilitate transaction flow for financing by the factoring entity. They could also enable early payments for suppliers via a portal or dashboard, based on static or dynamic discounts from a buyer. Additionally, a service provider might assist a bank or another institution in organizing a payables finance or reverse factoring program. This would involve onboarding suppliers and integrating invoices into the buyer's platform. In these scenarios, the financing or discounting is primarily driven by an entity other than the service provider.

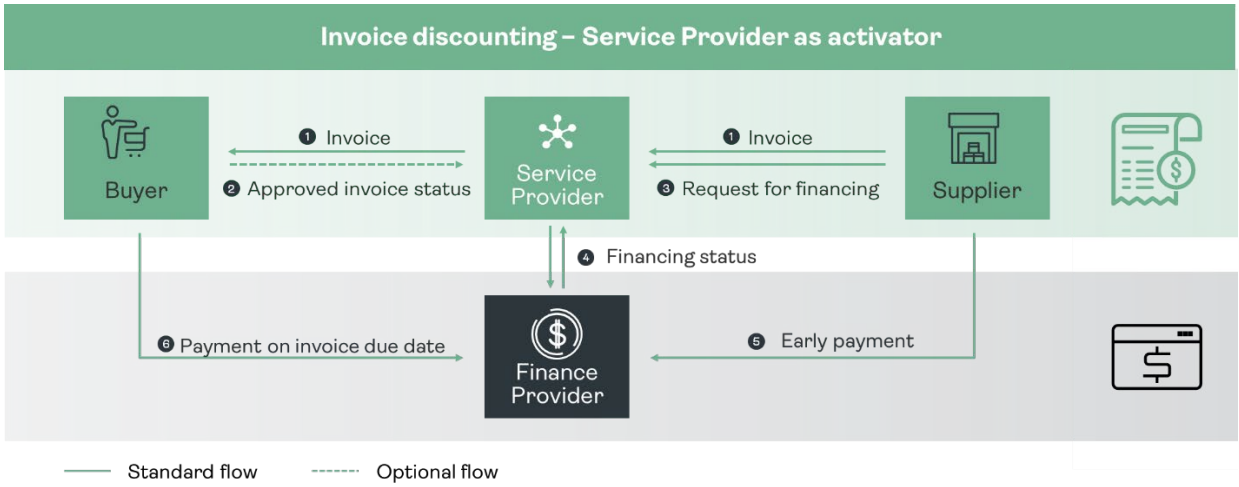
### 3.2.1 Receivables/Invoice Discounting

Receivables/Invoice Discounting, an advanced supplier-focussed financial instrument, is tailored for businesses that engage with a wide-ranging customer base and issue invoices on open account terms. This process involves a business selling its accounts receivable (invoices) to a finance provider at a discount, in exchange for immediate cash. This enables businesses to free up capital tied in unpaid invoices, enhancing cash flow and operational liquidity.

The end-customer is afforded a set period to pay the supplier for the invoice, offering a balance between immediate cash flow needs and customer payment terms. A key feature of this arrangement is the ability for a company to set up a 'master' invoice discounting facility. This facility allows the selective discounting of invoices for specific customers, subject to a predetermined maximum value of outstanding invoices.

Focus is placed on the combined value of the discounted invoices, their inherent credit quality, and in some cases, the availability of credit insurance to cover outstanding balances. While it's possible to discount invoices on a one-time, selective, or 'spot' basis, such 'single invoice' discounting is generally less common and often handled by banks under specialized arrangements or by FinTech firms.

In this setup, all receivables represented by the discounted invoices are typically sold or assigned to the finance provider, conforming to the legal requirements of the jurisdictions involved. This financial solution offers notable flexibility, allowing businesses to adapt their invoice discounting practices to their fluctuating funding requirements. It serves as a strategic tool for managing cash flow, providing immediate access to funds while waiting for customer payments.




### 3.2.2 Receivables Factoring

Factoring is a comprehensive supplier-centric financial solution for businesses, blending elements of debt financing and outsourced credit control. It involves a business selling its accounts receivable (invoices) to a third party (the factor) at a discount. This method is a well-established, supplier-focused approach to invoice financing, facilitating the mobilization of

funds through a revolving portfolio of outstanding invoices. Typically, these invoices come with predetermined payment terms, such as 30, 60, 90, or 120 days.

The factor evaluates the seller's overall business strength, the borrower's credit risk profile, and the quality of the receivables represented by the invoices being factored. Upon approval, the factor usually advances a percentage of the invoice value to the seller shortly after their issuance. This advancement process, contingent on legal jurisdictions, is conducted through the sale or assignment of the underlying receivables indicated by the invoices.

In addition to providing immediate capital, factoring offers businesses the advantage of delegated credit control. The factor manages the entire process of collecting payments from the end customers, which includes issuing reminders, managing the sales ledger, and pursuing overdue accounts. By taking over these administrative tasks, the factor allows the business to focus on core operations without the burden of managing credit and collections.

Upon collection of the payments, the factor deducts a fee for their services and remits the remaining balance to the business. This model not only improves cash flow for the business but also transfers the risk of bad debts to the factor, thereby offering a dual benefit of liquidity and credit risk management. Factoring is particularly beneficial for businesses looking to optimize cash flow, manage credit risk, and outsource the administrative burden of credit control.

### 3.2.3 Early Payments/Dynamic Discounting

Early payment discounts, often referred to as cash or prompt payment discounts, are an advantageous commercial arrangement between buyers and sellers, distinct from traditional financing methods. In this setup, buyers utilize their own liquidity to settle invoices prior to the stipulated due date. By doing so, they benefit from a reduced payment amount, while sellers gain the advantage of receiving funds earlier than the standard payment terms would allow. An example of such an arrangement is the '2% 10 Net 30' term, where the buyer is entitled to a 2% discount if payment is made within 10 days.

These discounts serve as a financial incentive for buyers to pay early and help suppliers improve their cash flow. It's a win-win situation: buyers save money, and suppliers get faster access to cash. This is particularly beneficial for suppliers, as it provides a more predictable cash flow and reduces the reliance on external financing.

Dynamic discounting takes this concept further by introducing a flexible, variable discount scale based on how early the payment is made. This model allows for more nuanced control over the timing and amount of discounts, providing additional flexibility for both parties. Finance providers support these arrangements through electronic invoicing and interactive dashboards, making the process more efficient and transparent.

Dynamic discounting allows buyers and sellers to dynamically change the payment terms to accelerated payment based on a sliding discount scale. The buyer allocates a ‘pool’ of liquidity, determines liquidity limits, and establishes the interest rate for early payments. Once invoices are approved, the suppliers are automatically informed about new early-payment options. Through the portal, suppliers can view their approved invoices and trigger payments prior to the nominal due date, accepting the corresponding discounts.

The dynamic discounting functionality may be directly implemented as a Plug-In in the ERP or accounting application of suppliers and buyers. Another smart way is a ‘Pay me early button’ on the buyer’s e-invoice portal (in case of direct exchange) or on the portal of the e-invoicing network operator.

Utilizing corporate liquidity for early payments is often considered a strategic use of funds, as it not only meets the payment obligations but also potentially yields a higher return compared to traditional money market investments.

### 3.2.4 Payables Finance

Payables Finance, alternatively referred to as reverse factoring, represents a buyer-centric financial mechanism. This arrangement enables suppliers to finance their accounts receivable monies owed for delivered goods or services. It is initiated by the purchasing entity, typically a large organization with robust creditworthiness. This setup allows suppliers to access more favourable financing terms, leveraging the buyer's superior credit standing instead of the terms available through direct lending sources.

The operational framework involves a finance provider collaborating with the purchasing company to establish a master facility. This facility is then extended to a select group of the buyer's suppliers. Part of this arrangement may include revising the payment terms on the invoices issued by these suppliers. Consequently, suppliers are presented with the option to monetize their receivables, which can be executed either through receivables assignment or via an advance payment model.

## 3.3 How New Payment Solutions and E-invoicing are Combatting the Late Payment Epidemic

### 3.3.1 Reasons for Late Payments of B2B and B2G Invoices

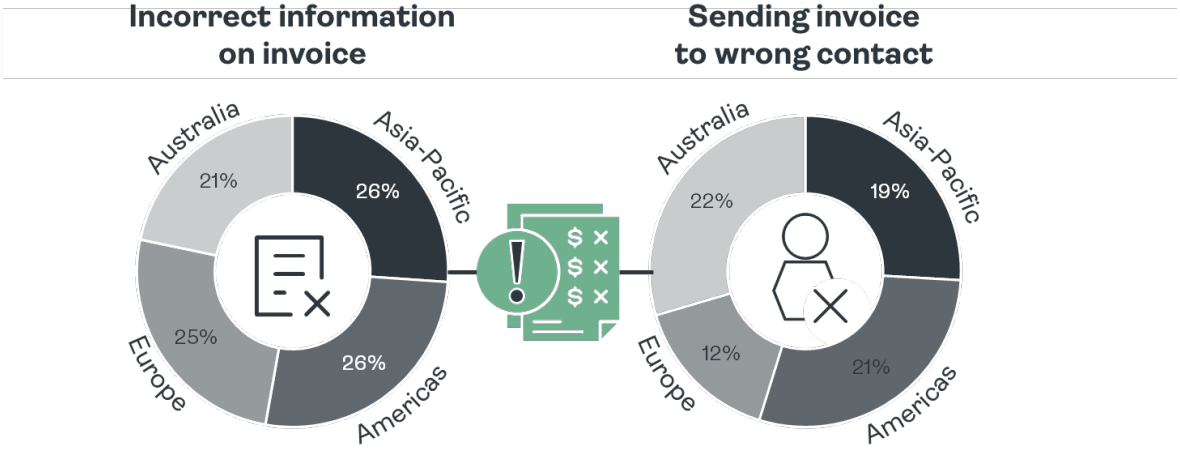
Looking at the main reasons why invoices are paid late, it becomes obvious that there is a strong relation between e-invoicing and payments. By late payments we mean payments that are paid later than the due date requested by the seller on the invoice. There are two main classes of late payments under this definition:

Firstly, there are scenarios that will result in late payments that arise from actions taken by the buyer. These could be slow and manual driven processes for approval as well as policies regarding the scheduling of payments according to internal ‘payment runs” or imposing extended credit terms on suppliers.

Secondly, sellers may experience payment delays because of issues arising during the invoicing process:

+ Invoices made out to an incorrect legal name or in the wrong legal domicile.
+ Invoices sent to the wrong address for the responsible business unit or individual.
+ Invoices contain the wrong reference data about a transaction, such as a Purchase Order (PO) number.
+ Problems with the actual supply of goods and services described in the line items on the invoice and requiring correction.
+ Incorrect classification of the goods and services for tax purposes or another problem with respect to the tax arising in specific circumstances.
+ Inadequate information about the means of payment or destination

This incorrect information on the invoice is a major reason for delays (Asia-Pacific 25,7%, Americas 26,3%, Europe 15,1%, Australia 21,4%). An example from Australia [13] indicates that in 2015 only 77% of invoices had the correct legal name, 66% the correct postal address and 58% the right business address. Sending the invoice to the wrong contact person is another almost equally important reason (Asia-Pacific 19,2%, Americas 21,4%, Europe 11,6%, Australia 21,9%).




As already described in both above and in earlier chapters, payments of invoices are all too commonly late with reference to requested due dates, the majority of which stipulate what can be described as 'normal' payment terms. The average payment delay for B2B invoices is reported [14] to be 50 days in Asia, 34 days in Western Europe and 32 days in Eastern Europe. In North America and Mexico about 60% of all invoices are paid late. For Australia this number is about 54%.

### 3.3.2 E-invoicing and Regulatory Initiatives to Overcome Late Payments

Typically, supplier related causes for late payments can be overcome by introducing e-invoicing as the following advantages apply:

+ The invoice is populated with static data that can be acquired and preserved in digital form for repetitive use. This includes addressing and payment data.
+ Where supply chain automation is applied to adjacent processes such as POs and Delivery Notes there is opportunity for internal checks at all stages of a transaction and routine reconciliation with the ERP system.
+ Tax management can be automated and linked to the tax declaration process.
+ Electronic invoicing creates the potential for transparency, distributed working, fewer fraud and errors, and speed of response by both the buyer and supplier.

Buyer related causes however have triggered numerous legal and regulatory initiatives to tackle the problem. These initiatives should create a more favourable environment for small and medium sized companies as they suffer most acutely from late payments often leading to serious liquidity problems and even bankruptcy.

To protect European businesses, in particular SMEs, against late payment and to improve their competitiveness, Directive 2011/7/EU on combating late payment in commercial transactions was adopted on 16 February 2011 and was due to be integrated into national law by EU countries by 16 March 2013 at the latest. The main provisions of the initiative are:

+ public authorities must pay for the goods and services that they procure within 30 days or, in very exceptional circumstances, within 60 days
+ enterprises must pay their invoices within 60 days, unless they expressly agree otherwise and provided it is not grossly unfair
+ provision for the automatic entitlement to interest for late payment and €40 minimum as compensation for recovery costs
+ statutory interest of at least 8% above the European Central Bank's reference rate

However, because of unsatisfactory results experienced with existing legislation the Commission is working on a revision of the Late Payment Directive and launched a call for evidence, a

public consultation and an SME panel. In March 2023 the European Innovation Council Executive Agency (EISMEA) in collaboration with the Directorate General for Internal Market, Industry, Entrepreneurship and SMEs (DG GROW) of the European Commission also launched the EU Payment Observatory. The EU Payment Observatory is a two-year initiative that should play a crucial role delivering transparency on payment discipline at EU level and will aim to provide SMEs with a modern and strong legal framework.

Besides those initiatives specifically focusing on late payments, the integration of payments is becoming an important part of increasingly common e-invoicing mandates. While the specifics can vary by country or region, the inclusion of payment messages in e-invoicing mandates typically means that the electronic invoice must contain not just details of the goods or services provided, but also information that facilitates the payment process itself. This can include payment terms, payment instructions, and sometimes even payment status updates. Some examples of regions and countries with e-invoicing mandates that may include aspects of payment messages and data are:

+ **Europe**: Italy's Sistema di Interscambio (SdI) for e-invoicing can include payment information, such as bank account details and payment terms. In their respective legislative frameworks, Spain and France have anticipated the necessity for reporting both the status of payments and the due dates associated with electronic invoicing processes. Within these jurisdictions, it is mandatory for either the purchaser or the supplier to notify their business counterpart as well as the tax authorities upon the execution or receipt of a payment.

+ **India**: The Goods and Services Tax Network (GSTN) in India mandates e-invoicing for mid-sized and large taxpayers. While the primary aim is to capture invoice details for tax purposes, the system also allows for the inclusion of payment information, which can facilitate the payment process.

+ **Latin America**: Countries like Brazil, Mexico, and Chile have some of the most advanced e-invoicing regulations globally. These systems often include detailed requirements for invoicing and may include payment information. For example, Brazil's Nota Fiscal Eletrônica (NFe) system encompasses invoicing and can include payment details.

+ **Saudi Arabia**: The ZATCA (Zakat, Tax and Customs Authority) e-invoicing system, also known as Fatoorah, mandates electronic invoicing and includes provisions for including payment data within invoices.

### 3.3.3 Dynamic Market Developments in Payments Create New Opportunities

Payment market developments are mirroring those observed in e-invoicing and supply chain automation, together reflecting a profound evolution in the financial transaction landscape. This evolution is primarily attributable to technology advances, shifts in business and consumer behaviour, and changes in regulatory frameworks and models.

Key global payment developments in payments are:

+ The move to electronic payments affecting all high value, commercial B2B and consumer payment services. The roll out of new schemes for instant payments are attracting growing volumes in Europe, North America and globally. The use of Internet Banking is leading to retail branch closures as industry economics change and all banking services can be accessed online.
+ The explosion in card payments, debit, credit, charge, mobile and ‘virtual’ with massive proliferation of point of sale (POS) and online infrastructure supported by enhanced security and authentication mechanisms.
+ New regulatory models that are designed to create a more competitive landscape by enabling non-bank players and FinTechs to provide payment services and directly

compete with banks/credit institutions. Such opportunities are discussed in section 4 below.

+ An important category of new model is described as Open Banking whereby a non-bank player has the right to securely access (with a customer's consent) a bank account from which to launch payment and information services. This has so far proved difficult to implement at the practical level leading to further regulatory developments to improve the situation.

Not surprisingly, global payment revenues are generating vigorous double-digit growth in most markets. Various forecasts predict the market will expand from between $1.6 trillion and $2,2 trillion in 2022 to between $2.2 trillion [15] and $3.2 trillion [16] by 2027 in terms of payment-related revenues. According to these projections, commercial payment revenues account for 53% of the total market value, with consumer transactions contributing the remaining 47%. This distribution varies by region, with commercial revenues dominating in the Asia-Pacific and EMEA regions. Conversely, in North America and Latin America, consumer transactions are the primary revenue source, predominantly through card transactions, accounting for 63% and 54% of the market, respectively. However, despite the rapid adoption of electronic payments and a relative decline in the number of economic transactions paid for with cash, some countries (especially the United States) maintain a substantial volume of transactions via cash and checks, with checks comprising about 40% of transaction volumes [17] in the United States.

The opportunities and revenue opportunities described above have led to major investments by incumbents and the emergence of over 5,000 FinTechs [15] offering payment-related services. Recent market developments facilitate the adoption of means of payment for recurring and one-off 'push' and 'pull' payments operated over real-time electronic rails. Over sixty jurisdictions [18] have introduced the transformative availability of instant payment services, enabling the immediate availability of funds for small-value transactions, such as the SEPA Instant Credit Transfer Scheme.

Enhanced data access and standardization are enabling a diverse array of applications, including real-time customer acquisition, faster onboarding, digital identity verification and strong customer authentication, digital wallets, and the use of QR codes etc. Digital wallets, as both the source and destination for large element of the instant payment volume, are experiencing significant growth especially in certain regions.

As B2B and B2G markets embrace instant payments, the cycle of sending an e-invoice, the initiation of the payment, and their reconciliation are also becoming a 24/7 real-time process.

As customers seek enhanced user experiences and businesses demand full supply chain automation, further innovative payment solutions in 'Embedded Finance' and 'Integrated Digital Trade' are emerging.

Market dynamics are changing, newer players are complementing head-on competition with the creation of alliances with banks and large payment users with the objective of embedding innovative services and access modes in their partner systems ('coopetition'). All this activity among FinTechs has not surprisingly prompted banks to refresh their own digital payment services as a competitive market response.

On the horizon is the potential implementation of Central Bank Digital Currencies (CBDCs); while still years from widespread implementation, CBDCs are under consideration by over 90% of central banks globally. The Bank for International Settlements estimates that by 2030, up to fifteen retail and nine wholesale CBDCs could be operational worldwide. The introduction of these digital currencies is expected to have a considerable impact on the payments ecosystem, highlighting the importance of the design and policy decisions in their development. CBDCs are the digital equivalent of physical cash and would create the opportunity to operate electronic payment services outside the scope of the traditional bank account.

### 3.3.4 Payment Solutions for New Players that Integrate Digital Payments with the E-invoicing Process

The payments market is well established and dominated by strongly capitalised incumbents, mainly banks and supporting infrastructural organisations such as credit card companies. The entry of FinTechs and e-invoicing service providers into this space requires time, resources, and carefully crafted value propositions. Such strategies are being executed through alliances as often as not.

Based on the above discussion in earlier sections on late payments, the role of e-invoicing, new regulatory models for payments, and rapid market developments, there are a multitude of opportunities available. The most compelling one of these is addressing the integration of the e-invoicing and digital payments processes much more coherently; the relationship between invoicing and payment processes is self-evident, but within the Business-to-Business (B2B) sector, these functions have historically been managed as separate processes. There are challenges for larger enterprises arising from a similar separation between IT systems for accounting, ERP, payment processing, and customer/ supplier databases. Integrating electronic invoicing with accounting systems frequently leads to reduced integration with payment mechanisms. For smaller enterprises there is a need for systems that can directly link invoice data to the payment interfaces they use.

The Global Network Exchange Association (GENA) has identified an array of opportunities for integrating e-invoicing and e-payments for businesses [19]. These take advantage of quite recent regulatory licences. They also allow for the achievement of product capability through in-house development or alliances.

Become a **Payment Service Provider**: This model offers payment services through various regulatory licences, such as

- the Payment Institution or Electronic Money Institution, which enable customer payment account and the offer of payment services.
- A Payment Initiation Provider (PISP), which has the right to access customer bank accounts for payment initiation services, and Account Information Provider (AISP), which aggregates and reports consolidated information, often from different banks.

Offerings could encompass:

- The facilitation of initiating and receiving payments, enhancing the invoice to payment process.
- A collection service for suppliers to manage multiple sales relationships.
- Integrated account information services aiding in reconciling payments with invoices and supporting comprehensive reconciliation processes.
- Electronic invoice presentment and payment via web services for consolidated invoice management.
- For online commerce and retail point-of-sale, instant invoicing and payment processes could enhance the checkout experience and customer satisfaction, offering an alternative to traditional card payments.

**Request-to-Pay (RTP):** This model facilitates the coordinated processing of invoices and payments without handling the payments directly. RTP offers automation and control over the payment process for both suppliers and customers. It allows suppliers to specify the timeline for payment acceptance and execution and includes remittance information for reconciliation. RTP enhances the traceability of invoices and payments, linking the invoice, request-to-pay message, agreement-to-pay message, and actual payment.

Potential use cases include:

- For B2B, enabling large suppliers to notify customers, such as retail outlets, to fulfil their payment obligations promptly.
- For smaller suppliers, facilitating easy payment completion for goods and services delivered to SME customers or consumers.

Offer **Payment Integration Services:** This includes the tight integration of e-invoicing with payment flows, reconciliation, and transaction-based reporting and monitoring services accessible to customers. These services can be offered alongside the afore-mentioned services or independently of any regulatory licence. This rather wide area is very susceptible to alliance strategies and could involve:

- E-invoicing service providers partnering with banks or Payment Institutes to offer payment execution services, focusing on a comprehensive suite of services supporting e-invoicing integration, reconciliation, and process optimization.
- E-invoicing service providers developing strategies to enable payment service providers, such as banks, to incorporate e-invoicing into their offerings, potentially targeting the SME market.
- Leveraging e-invoicing as a foundation for supply chain finance, where payment data triggers invoice financing processes, combining payment services with invoice finance and facilitating credit management decisions through invoice analytics and payment data.

### 3.4 E-procurement Rapidly Evolving into a Crucial Facet of Integrated Digital Trade

E-invoicing has achieved greater prominence and broader implementation across many countries compared to e-procurement. This disparity stems primarily from the fact that governments and tax authorities globally have prioritized e-invoicing, whereas e-procurement has been primarily driven by the private sector. According to data from Eurostat [20], in 2018, 17% of businesses in the EU with ten or more employees received at least 1% of their orders electronically.

Invoices play a crucial role in the procurement process. Many recurring invoices are linked to open-ended contracts, such as leases or maintenance agreements. While a large volume of goods and services are ordered through simplified means like telephone, online platforms, or email, formally structured purchase orders (POs) are less common, comprising only 6-7% of all invoices.

Currently, the full potential for optimization in this sector remains untapped. One significant barrier is the organizational structure within companies, where approximately 50% of purchasing and finance managers operate under separate reporting lines, often with considerable autonomy over their processes and digital transformation initiatives.

However, the landscape is evolving. The narrow focus on initial e-procurement and e-invoicing processes is no longer adequate. Formerly concentrated on e-invoicing, businesses are now progressing towards automating integrated digital trade processes. Similarly, entities initially focused on e-procurement are expanding their capabilities to include e-invoicing. This convergence is leading towards a more holistic and integrated approach, which could pose substantial challenges during the transition period for many businesses and solution providers. In this new era, procurement managers will need to engage more actively in e-invoicing projects that are crucial for leveraging the comprehensive benefits of accounts receivable (AR) and accounts payable (AP) automation.

| Issue | Impact of procurement managers on invoice process automation |
|---|---|
| Heterogeneous processes and systems for e-procurement and e-invoicing | + Holistic digitalisation and automation strategy |
| Supplier management and engagement | + Reducing fraud and identifying bad actors<br>+ Considering only the master data of tax-registered partners and increasing tax compliance<br>+ Streamlining and automating supplier interaction from onboarding to the processing of invoices and updating of master data |
| Contract and catalogue management | + Avoiding invoicing with incorrect amounts, ensuring accuracy of prices and compliance with synchronisations and data validations |
| Discount management | + Applying discounting models that can be reflected in business process automation solutions |
| Fake invoices, no or incomplete supply behind an invoice | + Establishing tax compliance processes, including evidence for supplies behind invoices |
| Purchase process | + Increasing the proportion of electronic orders and invoices<br>+ Automating the matching process |
| Evidence for tax compliance | + Storing the documents in a way they can be retrieved in the same index for the entire process cycle |

**Procurement managers are critical in navigating the challenges and maximizing the opportunities presented by business process automation. Leveraging their expertise in negotiation to minimize overall procurement costs, they are transitioning into roles as comprehensive value managers. Business process automation is a significant aspect of this transition. Consequently, enhanced digital collaboration with both internal line-of-business leaders and external stakeholders, including suppliers and B2B exchange platforms, will become increasingly vital.**

By 2030, we anticipate significant advancements in the integration and automation of procurement and invoicing processes. This progression will be further supported by public-sector initiatives throughout Europe.

### 3.5 VAT and Sales Tax Automation and Filing Inches Towards Integration with E-invoicing Systems

VAT (Value Added Tax) and Sales Tax (ST) automation in relation to e-invoicing involves using digital solutions to streamline the process of calculating, reporting, and paying taxes. This is increasingly important as more countries adopt e-invoicing regulations to enhance tax compliance and reduce fraud. Here are some key solutions and strategies for tax automation in the context of e-invoicing:

+ **Integration with Accounting Software**: Implementing e-invoicing solutions that seamlessly integrate with existing accounting or ERP (Enterprise Resource Planning) systems. This ensures that VAT/ST calculations are automatically aligned with sales and purchase data.

+ **Real-time VAT/ST Calculation**: Utilizing software that calculates VAT/ST in real-time during the invoicing process. This helps in ensuring accuracy and compliance with local VAT/ST rates and rules.

+ **Automated Tax Compliance Checks**: Implementing systems that automatically check invoices for compliance with tax regulations. This includes verifying VAT and Sales tax rates, tax identification numbers, and other mandatory fields.

+ **Audit Trails and Record Keeping**: Maintaining digital records of all transactions, including changes and corrections, to provide a clear audit trail. This is essential for tax audits and compliance checks.

+ **Cross-border VAT Handling**: For businesses operating internationally, implementing solutions that can handle multiple VAT regimes and keep up-to-date with varying international VAT laws and rates is crucial.

+ **Use of AI and Machine Learning**: Leveraging AI to improve VAT/ST reporting by identifying patterns, anomalies, and potential areas of non-compliance. This can be particularly useful for large businesses with complex transactions.

+ **Cloud-based Solutions**: Utilizing cloud-based e-invoicing and VAT/ST calculation solutions for scalability, flexibility, and ensuring that the system is always up-to-date with the latest tax rules and rates.

+ **Data Analytics and Reporting**: Advanced analytics can provide insights into VAT/ST liabilities, opportunities for tax reclaim, and overall tax efficiency.

+ **Supplier and Customer Onboarding**: Educating and integrating suppliers and customers into the e-invoicing platform to ensure seamless transactions and tax compliance across the supply chain.

Each of these solutions plays a role in creating a robust and efficient VAT/ST management process in the context of e-invoicing, helping businesses to comply with regulations, reduce errors, and optimize their tax position. It's important to choose solutions that align with specific business needs and are compliant with the legal requirements in the jurisdictions where the business operates.

## 3.6 Emerging Technologies like Artificial Intelligence are Changing the Market

### 3.6.1 The Search for New Technologies Supporting Business Automation

Within the invoicing cycle, a significant portion of tasks are both repetitive and time-consuming for both issuers and recipients. Despite this, at least 80% of invoices globally continue to be processed manually. While there is some utilization of scanning technologies for key data extraction, invoices are frequently exchanged solely in electronic formats. The validation of invoice data occurs on electronic invoice exchange platforms and within some processing systems, predominantly by the recipients of invoices. These procedures facilitate a decrease in the necessity for manual intervention in exceptions, generally reducing this requirement to approximately 20% or marginally less. How might emerging technologies further enhance the automation of these processes?

Over the past few years, there has been a significant transition towards the adoption of cloud services. Approximately two-thirds of European electronic invoices are currently being processed through cloud platforms, and this percentage continues to grow. Nonetheless, in certain nations, the adoption rate remains considerably lower, though our projections indicate it could increase to 70% by 2028. The drive towards cloud adoption is fuelled by its extensive benefits, including reduced and more flexible costs, enhanced agility and speed, improved change management, heightened collaboration, competitive edge, and access to cutting-edge technologies.

Artificial Intelligence (AI) is poised to be the next major disruptor in the business landscape. The rapid advancements in AI technology over recent years and months have demonstrated its capacity to significantly impact the e-invoicing sector.

### 3.6.2 Terms and Definitions for Artificial Intelligence

Artificial Intelligence (AI) refers to the simulation of human intelligence in machines that are programmed to think and learn like humans. The goal of AI is to create systems capable of performing tasks that would require human intelligence, such as reasoning, learning, problem solving, perception, and understanding natural language.

AI can be categorized into different subsets, each with its own specific focus and methodologies. The major subsets of AI include:

+ **Machine Learning (ML):** This subset focuses on the development of algorithms and statistical models that enable computers to perform specific tasks without using explicit instructions. Instead, they rely on patterns and inference derived from data. ML is all about making predictions or decisions from data, thus enabling machines to improve their accuracy over time as they are exposed to more data. ML is the backbone of many AI systems, providing the learning capability that allows these systems to adapt to new data independently. Deep Learning is a subset of Machine Learning and utilizes neural networks with many layers (hence 'deep') to analyse various factors of data. It's particularly effective for tasks such as speech recognition, image recognition, and natural language processing.

+ **Natural Language Processing (NLP):** NLP is another critical subset of AI that deals with the interaction between computers and humans using natural language. The ultimate objective of NLP is to enable computers to understand, interpret, and generate human language in a way that is both valuable and meaningful. NLP combines computational linguistics—rule-based modelling of human language—with statistical, machine learning, and deep learning models. This field enables a wide range of applications, including translation, sentiment analysis, and chatbots, by allowing machines to process and understand human language.

+ **Robotic Process Automation (RPA):** This is an application of technology that allows businesses to configure computer software or a 'robot' to capture and interpret existing applications for processing a transaction, manipulating data, triggering responses, and communicating with other digital systems. RPA is primarily focused on automating routine, rule-based tasks that require interaction with computer systems. This can include tasks like data entry, processing transactions, managing records, and even responding to simple customer service queries. RPA does not require the understanding or interpretation of data in the way ML does. Instead, it follows predefined rules and workflows to automate processes. While it can be enhanced with AI capabilities to handle more complex tasks that require decision-making or pattern recognition, RPA in its basic form is not about making decisions based on data patterns but about automating repetitive tasks.

  Academic studies [21][22] predict that robotic process automation (RPA) might start a new wave of efficiency gains. Oxford University [21] speculates that many jobs in the area of invoice processing may become automated by 2035, especially New Accounts Clerks, Data Entry Keyers, Order Clerks, Procurement Clerks, Claims Adjusters, Examiners and Investigators, Bookkeeping, Accounting, Auditing Clerks, Credit Authorizers, Checkers, Billing and Posting Clerks, Surveying and Mapping Technicians, Bill and Account Collectors, Accountants, and Auditors. The common feature of all these positions is a high proportion of repetitive work in the area of invoice processing.

+ **Expert Systems**: Expert Systems are a branch of AI that focuses on mimicking the decision-making ability of a human expert. They are designed to solve complex problems by reasoning through bodies of knowledge, represented mainly in if-then rules rather than through conventional procedural code. Expert systems are one of the earliest forms of AI and are used in applications requiring specialized knowledge or expertise, such as medical diagnosis, engineering, finance, and more. They rely on a knowledge base and a set of inference rules to simulate the expertise of human specialists.

All these technologies are interrelated under the broad umbrella of AI, each contributing to the goal of creating machines that can act and think with some degree of human-like intelligence. While ML provides the learning capabilities, NLP focuses on understanding and generating human language. RPA automates routine tasks, potentially enhanced by AI to handle more complex processes, and Expert Systems simulate the decision-making process of human experts. Together, these technologies demonstrate the diverse applications of AI and its potential to transform industries by automating tasks, deriving insights from data, and enhancing decision-making processes.

**'Generative AI'** is a significant aspect of the next generation of artificial intelligence technologies. Generative AI encompasses algorithms and models that can generate new content, including text, images, music, and even code, that is similar to human-generated content. This field has seen rapid advancements, particularly with models like GPT (Generative Pre-trained Transformer) for text generation and DALL-E for image generation, both developed by OpenAI.

These advancements suggest a shift towards more creative, versatile, and autonomous AI systems capable of performing tasks that require creativity and innovation, alongside traditional analytical capabilities. Generative AI models have applications in various domains, including entertainment, art, design, content creation, and even scientific research, where they can generate novel hypotheses or simulate data.

The designation of 'next generation' highlights the evolutionary leap in AI's capabilities, moving from systems that primarily analyse and interpret existing data to those that can create new, original outputs.

### 3.6.3 The Role of Artificial Intelligence within the E-invoicing Process

Artificial intelligence (AI) plays a significant role in enhancing and streamlining the e-invoicing process. The integration of AI technologies with e-invoicing systems offers several benefits and opens up numerous future possibilities. Here's a breakdown of the current applications and potential future uses:

**Current Applications**

- Automated Data Capture and Entry: AI algorithms are capable of extracting data from various invoice formats automatically, reducing the need for manual data entry. This not only speeds up the process but also minimizes errors.
- Fraud Detection: By analysing patterns and anomalies in invoicing data, AI can help identify potential fraud. This includes detecting duplicate invoices, irregular transactions, and other suspicious activities that might indicate fraudulent behaviour.
- Compliance Monitoring: AI systems can be trained to understand and monitor compliance with local tax laws and regulations related to invoicing. This helps businesses stay compliant and avoid penalties.
- Process Optimization: AI can analyse invoice processing workflows to identify bottlenecks and inefficiencies, suggesting improvements or automating certain steps to enhance overall efficiency.
- Predictive Analytics: By analysing historical invoicing data, AI can provide insights into future trends, such as predicting cash flow issues or identifying opportunities for early payment discounts.

**Possible Future Applications**

- Enhanced Natural Language Processing (NLP): Future advancements in NLP could enable AI systems to understand invoices written in natural language, further reducing the need for human intervention in data extraction and processing.
- Smart Contracts Integration: Integrating AI with blockchain technology and smart contracts could automate the entire invoicing and payment process, making transactions more secure, transparent, and efficient.
- Dynamic Pricing Models: AI could enable dynamic pricing strategies where the invoicing system adjusts prices in real-time based on demand, availability, customer relationship, and other factors.
- Autonomous Dispute Resolution: AI systems could handle disputes over invoices by analysing contract terms, service delivery proofs, and communication between parties, suggesting or even implementing resolutions without human intervention.
- Predictive Supplier and Customer Management: AI could predict supplier or customer behaviours, such as risk of late payment or likelihood of order cancellation, allowing businesses to proactively manage relationships and finances.
- Global Tax Compliance: As businesses expand globally, AI could help manage the complexity of adhering to diverse tax laws and invoicing regulations across different countries, automatically updating systems as laws change.

The integration of AI into e-invoicing represents a significant step towards digital transformation in finance and accounting. As AI technologies evolve, they will continue to revolutionize the invoicing landscape, making processes more efficient, secure, and user-friendly.

### 3.6.4 Blockchain: Integrating Conventional and Decentralised Financial Systems

In the 2019 billentis report, the future impact of blockchain technology was still uncertain—potentially a pivotal innovation or merely a fleeting trend. However, developments since then have signalled its increasing acceptance and integration into mainstream finance. Notably, in January 2024, the U.S. Securities and Exchange Commission approved several Crypto-ETFs, enhancing their appeal to institutional investors [23]. Earlier, in May 2023, the European Parliament ratified the Markets in Crypto-Assets Regulation (MiCA), establishing a regulatory framework across Europe that promotes the innovative use of crypto-assets while ensuring financial stability and protecting investors. Furthermore, the introduction of the pan-European Blockchain Regulatory Sandbox in 2023 has facilitated ongoing dialogue between blockchain practitioners and regulators, aiming to resolve pertinent legal and regulatory issues [24]. These initiatives collectively demonstrate a committed trajectory for the evolution of blockchain technology.

Despite these advances, the journey has encountered obstacles. In 2023, the TradeLens joint venture, a blockchain-enabled digital platform for global trade launched by IBM and A.P. Moller-Maersk in 2016, was discontinued due to financial untenability. Concurrently, similar blockchain-based trade finance platforms, we.trade and Contour, also ceased operations, followed by the insolvency of the Marco Polo Network in 2023.

Nevertheless, the institutional perspective on blockchain remains positive. A prime example is the 'safe Financial Big Data Cluster (safeFBDC)' project, supported by the German Federal Ministry for Economic Affairs and Climate Action. As part of this initiative, Fraunhofer Institute for Material Flow and Logistics IML, has developed blockchain applications that enhance supply chain financial resilience and efficiency. These applications use smart contracts for autonomous invoicing and tokenize trade receivables, which facilitates sophisticated invoicing processes, programmable payments, and the foundation for AI-enhanced financial analysis and risk management [25].

As the technology and its regulatory environment mature, blockchain's role in asset tokenization is poised to significantly alter financial market infrastructures. Tokenization makes both tangible and intangible assets tradable on blockchain via smart contracts, encapsulating ownership in digital form. This innovation is pivotal to the rise of Decentralized Finance (DeFi), which offers an accessible, open financial system through decentralized networks. DeFi replicates traditional financial services such as lending, exchanges, and insurance, utilizing smart contracts executed by blockchain networks to maintain integrity and global synchronicity [26]. The assets managed in DeFi smart contracts surged from under $1 billion in early 2020 to over $45 billion by the end of 2023 [27].

The synergy between asset tokenization and DeFi is set to drive forward the adoption of blockchain, enhancing the stability and liquidity of the crypto ecosystem with secure, real-world collateral. This integration is essential for the advancement of decentralized blockchain-based financial systems and will play a crucial role in future blockchain-enabled business ecosystems. Properly structured electronic invoice information remains a critical component for all related applications, ensuring efficient operation and compliance in this evolving space.

## 3.7 Organisations Boost Environmental, Social and Governance (ESG) Performance through Strategic E-invoicing Transition

Environmental, Social, and Governance (ESG) constitutes a paradigm through which investors and corporations assess the operational impact of a business within the broader environmental and societal frameworks. Electronic invoicing significantly enhances the ESG values, align-

ing with overarching objectives of sustainability and ethical corporate conduct. While the environmental advantages are the most apparent, e-invoicing also substantially contributes to social and governance improvements. Consequently, organizations may leverage the transition to e-invoicing as a strategic measure to bolster their ESG performance and reporting.

The **environmental implications** of invoicing are significantly influenced by considerations surrounding their carbon dioxide (CO2) emissions. The assessment of a paper invoice's CO2 footprint necessitates a comprehensive analysis encompassing the entire lifecycle of the invoice, from paper production through to its final delivery to the recipient. Key factors include:

+ Invoice Production:
  - Paper Type: The use of recycled paper is associated with lower CO2 emissions in comparison to virgin fiber paper.
  - Energy Source: Employing renewable energy sources, such as wind or solar, during the manufacturing process markedly diminishes the CO2 footprint relative to the utilization of fossil fuels.
  - Manufacturing Efficiency: Advanced, efficient manufacturing facilities are capable of reducing energy consumption and consequently, CO2 emissions.
  - Materials: The environmental impact assessment extends beyond the paper itself to include related materials such as envelopes and stamps.
  - Number of Sheets: The average number of sheets per invoice also affects the CO2 calculation. This average can fluctuate based on the customer type (Business-to-Business (B2B) vs. Business-to-Consumer (B2C)) and varies across different sectors (e.g., telecommunications/utilities vs. industry). It is posited by various stakeholders within the e-invoicing sector that the average is approximately 2.5 pages per invoice.

+ Printing of invoices:
  - Digital Printing Efficiency: Employing digital printing techniques can enhance efficiency over conventional printing methods, particularly for smaller quantities.
  - Ink Selection: The environmental impact, including the carbon footprint, is influenced by the choice of ink, such as oil-based versus water-based. The environmental detriment arises from the harmful chemicals in printer ink, the non-degradable plastic components, and petroleum oil in some ink and toner cartridges, leading to significant pollution when they reach the end of their lifecycle. Often disposed of in landfills or aquatic environments, these cartridges release toxic metals and volatile organic compounds (VOCs), causing extensive soil and water contamination. Presently, less than 30% of these cartridges are recycled [28].

+ Invoice Processing and Administration:
  - Efficiency of Office Appliances: Utilizing energy-efficient machinery for invoice preparation tasks like folding, enveloping, and sorting can contribute to the reduction of carbon emissions.
  - Administrative Energy Use: The energy expended in the invoicing process, particularly through computer systems, and the additional time required for processing paper invoices, should be factored into the carbon footprint calculation of the personnel involved.

+ Transportation and Delivery:
  - Transportation Method: The choice of transportation, with air freight markedly increasing carbon emissions in contrast to alternatives like trucks, trains, or ships.
  - Transportation Distance: Carbon emissions are also dependent on the distance between the printing facility and the invoice recipient.

- Delivery Efficiency: Enhancing the efficiency of the last-mile delivery, especially in urban areas through the use of low-emission vehicles (for instance, electric cars or bicycles), can mitigate emissions.

+ Disposal and Recycling:
  - Recycling Practices: The potential for recycling used paper can significantly decrease the overall carbon footprint of an invoice, as recycled materials necessitate fewer resources for the production of new paper goods.
  - Disposal Methods: The technique employed for the disposal of paper invoices (e.g., landfill versus incineration) influences the carbon balance.
  - Digital Archiving: Adopting electronic invoicing eliminates the need for physical archiving, thereby saving on the energy and space required for storage.

Determining the exact carbon dioxide (CO2) footprint of a paper invoice requires a comprehensive analysis of various factors, encompassing the emissions from production, printing, shipping, and disposal processes. Given the complexity of quantifying several of these elements, numerous studies have concentrated solely on the emissions saved by foregoing paper.

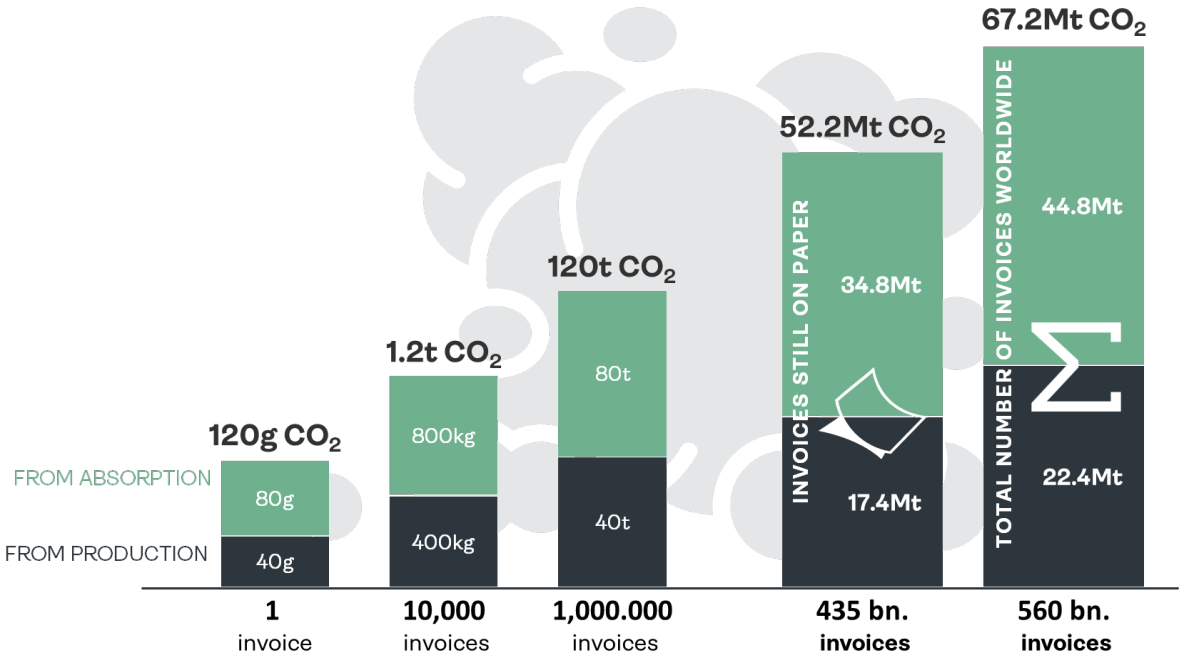
The CO2 emissions associated with producing one kilogram of paper can significantly fluctuate based on the paper type, raw material sources, manufacturing process, and the energy utilized during production. Typically, paper production entails tree harvesting, transportation, pulping, paper manufacturing, and, in some cases, recycling—each phase adding to the total CO2 emissions.

The carbon footprint of paper is commonly estimated to range from 1.45 kg to 3.6 kg of CO2 per kilogram of paper, reflecting the diversity in production techniques. Recycled paper generally exhibits a lower carbon footprint compared to virgin fibre paper. The lower end of this spectrum is indicative of modern, efficient, and environmentally friendly production methods that often leverage renewable energy and a greater proportion of recycled content. Conversely, the higher end may reflect less efficient production methods, reliance on fossil fuels, and the use of virgin wood fibres.

Adopting a conservative estimate of 2 kg CO2 per kilogram, the CO2 footprint for a single 20g paper invoice would be approximately 40g. This figure acknowledges that the CO2 footprint from electronic invoicing is not sufficient to offset the emissions from printed invoices other than paper production (including transport, ink, archiving), thus maintaining the 40g CO2 estimate as a cautious approach.

Furthermore, the conservation of paper also contributes to the preservation of trees, which are capable of sequestering additional CO2. On average, a mature pine tree, commonly utilized in paper production, can yield about 8,333.3 sheets of standard office paper [29]. However, this simplistic calculation does not account for the complete lifecycle of paper production, including yield loss during processing, the incorporation of recycled paper, and variances in tree size and type. Therefore, the actual figures may significantly differ. Assuming an invoice uses an average of 2.5 pages, approximately 3,000 invoices equate to the usage of one tree.

The capacity for CO2 absorption by a single tree is highly variable, influenced by the tree's species, age, environment, and health. A general estimate from the United States Department of Agriculture (USDA) suggests that a mature tree can absorb about 22 kilograms of CO2 annually. This average acknowledges the variability in absorption rates due to the previously mentioned factors. Based on this, 3,000 invoices, each comprising 2.5 sheets of paper, would result in the absorption of approximately 22 kg of CO2 annually. Assuming a minimum lifespan of ten years for a mature tree prior to harvest, this equates to an absorption of 80 grams of CO2 per invoice.




The implementation of electronic invoicing offers numerous **social advantages**, particularly benefiting Small and Medium Enterprises (SMEs) in the following ways:

+ Accessibility and Inclusivity: E-invoicing enhances accessibility for individuals and businesses globally, including those in remote or underserved regions. It facilitates quicker and more efficient transactions, bolstering the economic sustainability of SMEs and potentially aiding in broader economic growth.

+ Transparency and Traceability: Electronic invoices offer superior tracking and storage capabilities compared to traditional paper invoices, enhancing transactional transparency and facilitating easier audits and verification processes. This improvement aids in combating fraud and ensures adherence to regulatory standards, benefiting all parties involved.

+ Financial Efficiency: E-invoicing introduces significant financial benefits. Primarily, electronic invoices tend to be settled 5-7 days sooner than paper invoices, diminishing the need for external financing. This is particularly crucial for SMEs, which often face challenges in accessing financial resources. Additionally, the advent of new Invoice Finance solutions, such as those allowing for the financing of individual invoices and those not requiring a historical financial track record as they are based on approved invoices, simplifies and accelerates the financing process, making it less bureaucratic and more accessible.

+ Impact on the Shadow Economy: As outlined in previous chapters, the initiation of tax reporting mechanisms significantly boosts a country's tax revenue. This increase in revenue benefits society as a whole by potentially reducing the size of the shadow economy.

E-invoicing significantly enhances **governance benefits** across several dimensions:

+ Compliance and Standardization: It streamlines adherence to regulatory frameworks by simplifying compliance with tax laws and invoicing standards. As many jurisdictions increasingly mandate e-invoicing for tax purposes, electronic systems offer

the flexibility to promptly adapt to legislative amendments, ensuring that governance standards are consistently upheld.

+ Improved Internal Controls: The integration of e-invoicing systems bolsters internal oversight of financial transactions. By automating invoice processing and reconciliation, it diminishes the likelihood of inaccuracies and fraudulent activities, thus ensuring more reliable financial reporting.

+ Enhanced Efficiency and Accountability: E-invoicing enables organizations to optimize their invoicing procedures, reduce administrative burdens, and enhance accountability. This automation not only leads to more efficient operations but also promotes a culture of transparency and responsibility within enterprises.

+ ESG Reporting Enhancement: An increasing number of companies are mandated to conform to ESG reporting standards. While in the UK and US, this requirement predominantly applies to capital market participants, the European Union's Corporate Sustainability Reporting Directive (CSRD) extends it to nearly 50,000 companies from January 2024. The CSRD aims to bridge the gaps in existing reporting frameworks and broaden the scope of sustainability reporting, marking the introduction of compulsory reporting standards at the EU level for the first time, thereby elevating the accountability of European businesses in sustainability matters.

  The implementation of e-invoicing is particularly pivotal in this context, especially as it pertains to the intricate task of ESG reporting, which becomes significantly more demanding for SMEs. Reporting on scope 3 emissions, which necessitates integrating supplier data, presents a notable challenge. E-invoicing stands out as a crucial tool in this regard, potentially providing essential data, including the Product Carbon Footprint and Scope 1, 2, and 3 emissions according to the Greenhouse Gas Protocol. Should such information be incorporated into the European standard for e-invoicing, companies could leverage an established process to extract all requisite data, facilitating comprehensive reporting across various supply chain levels.

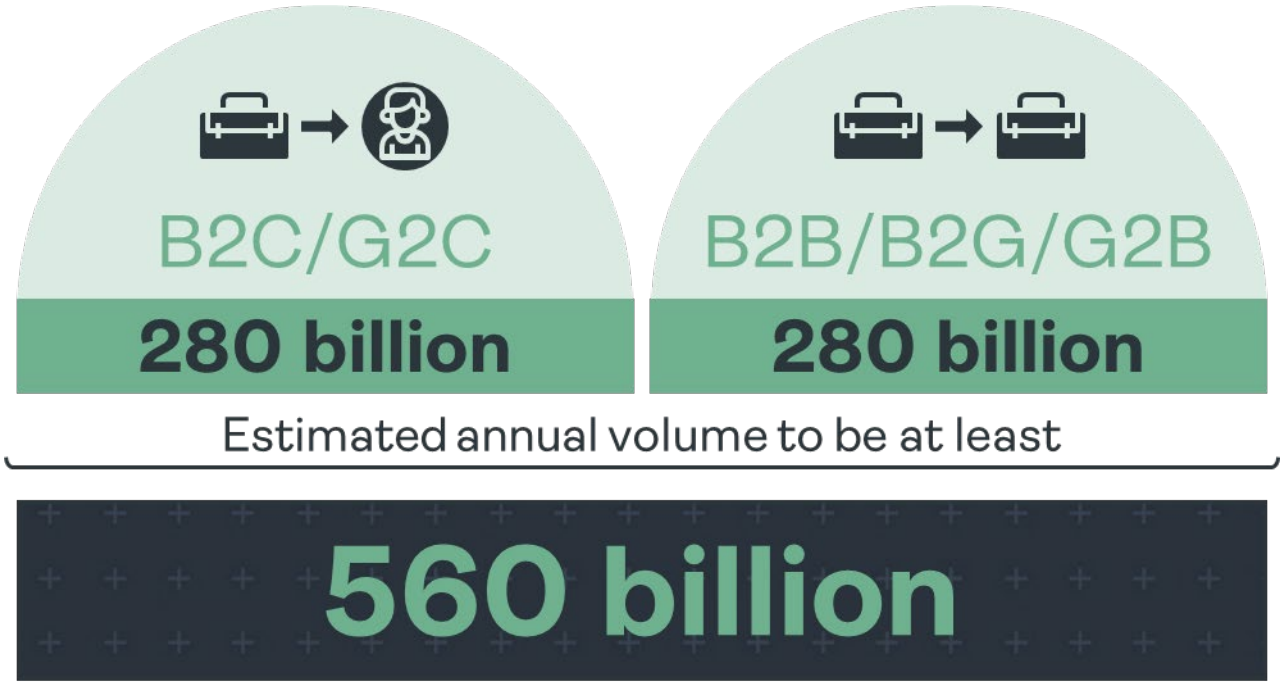
# 4. The Global Market

## 4.1 Invoices and Electronic Invoice Penetration in 2024

### 4.1.1 Total Volume of Bills and Invoices

The issuance of both paper-based and electronic bills and invoices across Europe and Latin America has been systematically recorded over multiple years. Recent disclosures of data from credible entities regarding China, coupled with robust signals from the Russian marketplace, have enabled a fairly precise estimate of transaction volumes within the Asian sector. Estimations for the volumes pertaining to additional global areas have been meticulously derived through the application of critical metrics from the previously mentioned world regions.

Estimate for global bill/invoice volume 2024:




Globally, the average distribution of bills/invoices, as strictly defined legally, is about 70 per individual per year. Although metrics vary widely by region, an overall upward trend is evident.

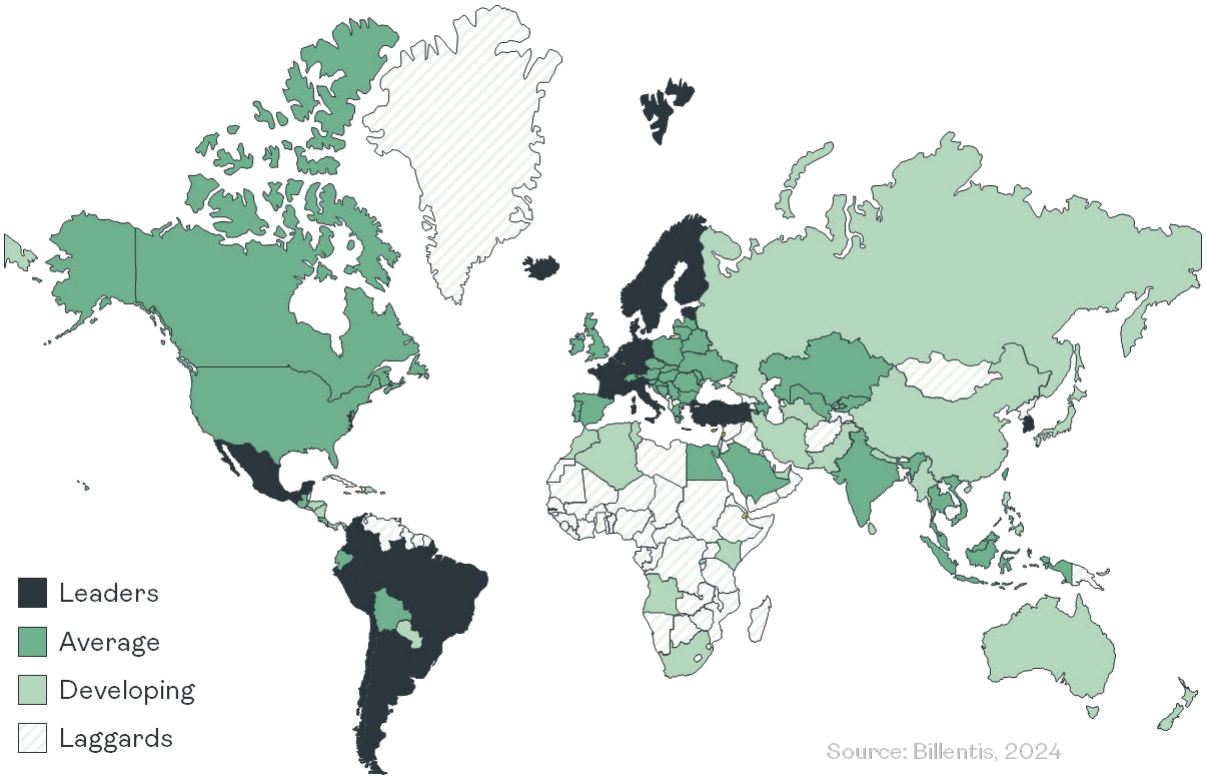
It is projected that roughly 50% of this volume relates to service supplies, with the balance being attributed to the exchange of physical supplies.

Within the broader legal framework, the proliferation of documents resembling invoices, often referred to as 'invoice-like documents and messages', including receipts, can vastly outnumber traditional invoices, potentially by a margin of 5 to 15 times, with variations depending on the jurisdiction. We are receiving progressively accurate volume data from Latin America; however, comparable statistics from other regions remain unavailable. Consequently, we are referencing this range broadly in the document but have excluded these figures from the data presented in this chapter.

### 4.1.2 Maturity and State of Play of Electronic Invoices

Market maturity differs across continents and within the countries of each continent.

Expected status for all bill/invoice streams - B2B, B2G, G2B, B2C and G2C -
Digitally issued by suppliers & received by buyers




The terminology 'Laggards' depicted in the preceding chart should not be construed as indicative of a complete absence of e-invoicing initiatives in these nations. Rather, it signifies that these countries are generally at a nascent phase or are presently concentrating on specific invoicing channels. The classification 'Developing' refers to nations that have initiated e-invoicing practices, usually within the B2C domain and/or involving Electronic Data Interchange (EDI) among larger enterprises.

**Worldwide, billentis expects a total volume of 125 billion by 2024, of which 90 billion will be e-invoices and the remaining 35 billion will be e-receipts.**

**Expected global volume of e-invoices and personalized e-receipts in 2024: 125 billion**
*Strongly rounded figures*

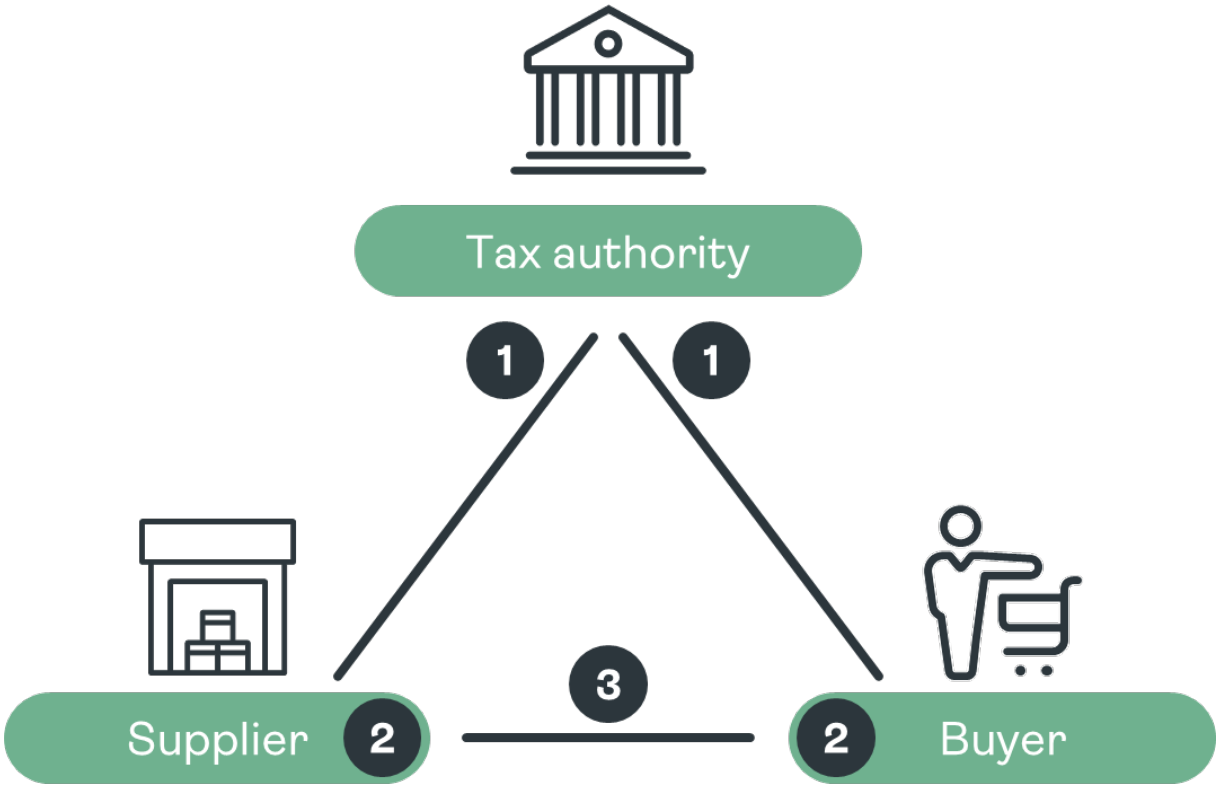
| Recipient segment | Europe | LATAM | North America | APAC | Rest of World |
|---|---|---|---|---|---|
| Consumer | **8** (38%) *of 21* | **17** (48%) *of 35* | **7** (41%) *of 17* | **33** (17%) *of 190* | **1** (7%) *of 14* |
| Business & Government | **11** (52%) *of 21* | **18** (51%) *of 35* | **9** (53%) *of 17* | **20** (11%) *of 190* | **1** (7%) *of 14* |

Estimated electronic volume in billion (proportion in %)
*of total invoice volume in billion*

Relative growth rates

### 4.1.3 Regions Diverge in Focus: Tax Optimization and Trade Automation Trends Vary Globally

Numerous parallels exist in the utilization of invoices globally. The endeavour to adopt electronic invoicing and persuade trading entities presents a similar challenge. Nonetheless, significant disparities arise from diverse legislation, languages, cultures, and the current emphasis on optimization. While not universally applicable across all countries and organizations, it has been determined that the focus on optimization can generally be summarized as follows:




| Focus | Description |
|---|---|
| 1 | **Africa, Asia, LATAM and some European countries:** Tax authorities are initiating nationwide initiatives focused on minimizing tax evasion. These require taxpayers to submit either detailed invoice data or, at the very least, electronic invoice extracts for validation and audit purposes.<br>In a departure from conventional paper-based methods, tax authorities are creating and instituting an entirely new framework. This introduces a CTC system for trading entities, which is relatively complex. While this transformation may not immediately enhance the efficiency of companies' internal invoice processing or the electronic collaboration between suppliers and buyers, it significantly simplifies and improves the process of VAT declarations and tax filings. |
| 2 | **North America up today:** Large and medium-sized enterprises primarily focus on optimizing their internal processes. Automation of Accounts Receivable and Accounts Payable, along with Trade Finance and Working Capital Management, are key areas of concentration. However, the market is progressively maturing, making it a ripe time to prioritize focus area three. |
| 3 | **Major parts of Europe, Japan, Southeast Asia, Pacific Region and increasingly the U.S.:** Traditional invoicing and processing techniques have not been subjected to rigorous examination; instead, they have been substituted with an equivalent functional digital alternative. Where necessary, either a portion or the entirety of the invoice details may also be shared with tax authorities. |

| | |
|---|---|
| | Despite the market remaining considerably segmented, the strategy within Europe is characterized by a comprehensive and unified approach, underpinned by a pronounced willingness to cooperate among all involved parties. Furthermore, previous investments in business process automation are safeguarded. |

In the long term, suppliers, purchasers, and tax authorities universally seek advantages through electronic invoicing. This dynamic fosters an environment where continents may mutually benefit from shared best practices and adopt superior components from one another. Presently, there is significant momentum toward the adoption of the 5-corner model across numerous countries in Europe, the Middle East, and Southeast Asia. This movement stems from the belief that the solution should not only address the requirements of tax authorities but also establish a foundational framework for the comprehensive automation of Integrated Digital Trade.

## 4.2 Global Progress in the Adoption of Electronic Invoices and Receipts

### 4.2.1 Africa

Electronic Data Interchange (EDI) is gaining prominence within industries characterized by high volumes, such as retail, for the purpose of exchanging commercial invoices and other business communications. This adoption seeks to enhance automation and reduce operational costs. Nevertheless, adoption rates remain relatively low.

A significant challenge in many African regions involves generating tax-compliant invoices via electronic means following each sales transaction.

It's critical to acknowledge the limited digital infrastructure within these regions. Nonetheless, mobile devices are emerging as a viable foundation for many African countries, with notable acceptance within the Small and Medium Enterprise (SME) sector and amongst consumers. Digital finance and electronic point-of-sale (POS) invoicing are perceived as the most viable strategies to boost e-invoicing adoption in the African mass market. Mobile phone adoption stands at approximately 60%, while internet penetration is around 36%. Beyond mobile applications, cloud-based platforms also offer a solution for generating invoices.

The VAT compliance gap in Africa is close to 50%, as reported by the United Nations Economic Commission for Africa [30]. Consequently, approximately one-fourth of African countries have initiated or implemented electronic oversight mechanisms for business transactions. This starts with the fact that companies have to record all business transactions digitally internally. This creates the basis for transmitting relevant data to the authorities for reporting purposes. Reporting requirements often begin with transaction data generated by electronic or virtual financial devices.

**Egypt** is at the forefront in Africa regarding the implementation of e-invoicing and e-receipts. In recent years, Egypt has developed a central government platform for B2B e-invoicing and has progressively introduced it across the business sector. This system imposes stricter requirements than many other platforms abroad, necessitating Global Product Code classification for invoice content and digital signatures verified by hardware-based certificates. Furthermore, suppliers are required to generate e-receipts with QR Codes at the point of sale and submit this data to the tax authority.

The drive to combat tax fraud remains a primary motivator for the digital transformation of invoice and receipt processing in African nations. It is anticipated that an additional 25 African countries will implement Continuous Transaction Controls (CTC) systems by 2030.

### 4.2.2 The Asia and Pacific Region

Leaders in the field, such as Kazakhstan, Singapore, South Korea, Taiwan, and Turkey, have already achieved significant market adoption rates. Following their footsteps, India, Indonesia,

Russia, Thailand, and Vietnam have embarked on nationwide initiatives. Simultaneously, various nations are either launching new endeavours or broadening the scope of their existing electronic invoicing and tax reporting projects to encompass additional user demographics.

**Australia and New Zealand** are vigorously advocating for electronic invoicing across a wide spectrum. These nations are advancing e-invoicing as a component of the Single Economic Market agenda, which is designed to enhance productivity and decrease business operational costs for both the government sector and the industry, through the establishment of an interoperable single digital economic market based on the Peppol interoperability framework. The majority of government agencies are now equipped to handle e-invoices. Moreover, both countries are proactively promoting e-invoicing within the B2B sector, with a B2G mandate also anticipated in the foreseeable future.

**China**, the nation with the highest volume of invoices, sees over 200 billion invoices generated annually, as per local reports. In 2021, a national service platform for electronic tickets and unified invoices was inaugurated. The introduction of the fully digitalized special e-fapiao represents the Chinese government's latest initiative towards the digital enhancement and intelligent overhaul of tax collection and administration processes, aiming to lower the cost of tax management. By the end of 2023, all Chinese provinces had rolled out their e-fapiao programs, setting the stage for enterprises to eliminate paper invoices and streamline their invoice processing workflows. A nationwide B2B mandate is expected by 2025.

The **Gulf region** is poised to become a global focal point for CTC and e-invoicing projects in 2024 and 2025. In 2024, Saudi Arabia is continuously extending its e-invoicing mandate to encompass companies with revenues ranging from SAR 25 to 30 million (approximately 6.2 to 7.4 million Euros). The governments of Bahrain, Jordan, Oman, and the UAE are also advancing their respective projects.

In recent years, **India** has expanded its e-invoicing mandate. Companies with revenues exceeding INR 50 million (approximately 0.55 million Euros) are now mandated to submit B2B e-invoices to the Goods and Services Tax Network (GSTN). It is anticipated that this requirement will extend to B2C invoices by 2026 or 2027.

Since July 2016, nearly all taxable entrepreneurs in **Indonesia** are obliged to issue their VAT invoices (Faktur Pajak, FP) electronically and complete tax payments exclusively online. On the purchasing side, the received e-invoice must be validated either through the VAT input feature in the e-invoice application or by scanning the invoice's QR code. Nonetheless, it is common practice for many buyers to request a paper version of the Faktur Pajak from suppliers before proceeding with payment, ensuring that the Faktur Pajak has been duly reported to the Indonesian tax authority.

In 2023, **Japan** introduced a new so-called Qualified Invoice System, facilitating the acceleration and automation of business processes. The 'E-Invoice Promotion Association' (EIPA) was established with the goal of developing and promoting a standardized e-invoicing interoperability framework based on Peppol, leveraging the usage of the qualified invoices.

The **Malaysian** government has imposed centralised e-invoicing CTC mandates for B2B, B2C, and B2G transactions, with a phased implementation commencing in the second half of 2024. By mid-2025, all taxpayers are expected to fall in the obligation. In parallel MDEC (Malaysia Digital Economy Corporation) has been given the responsibility to define local Peppol specifications and technical standards and to accredit Peppol service providers and Peppol-ready solution providers, in order to foster the commercial uptake of e-invoicing in Malaysia. In addition the agency is overseeing compliance with the overall framework.

**Pakistan** is in the process of introducing a combination of centralized e-invoicing and fiscal systems or registers for B2B and B2C invoicing, respectively [31].

During a pilot phase in 2022, approximately 100 large taxpayers in the **Philippines** participated in testing the e-invoicing/e-reporting program, which is modelled after South Korea's e-Tax invoice system.

### 4.2.3 North America

In the business-to-business (B2B) and business-to-government (B2G) sectors, the strategies and goals widely vary from those observed in European and Latin American contexts. Presently, U.S. companies are prioritizing the enhancement of internal processes, specifically in the areas of 'order-to-cash and accounts receivable (AR) automation' along with 'purchase-to-pay and accounts payable (AP) automation'. Research indicates that the United States has moved beyond the initial stages of adopting electronic invoicing, with a growing interest in this area.

Because the U.S. does not have VAT, but a sales tax system, invoices are not considered any different from other business documents. This has delayed the acknowledgment of the benefits provided by e-invoicing network operators within the U.S. market. However, a steady increase in the number of such operators is now anticipated. International corporations operating in the U.S. are mandated to adhere to local regulations, often engaging third-party service providers for compliance.

There is a scarcity of surveys that include or relate to e-invoicing, with most concentrating on the AP aspect and largely targeting significant enterprises.

The findings from various sources for larger corporations are summarized as follows:

+ Approximately two-thirds of businesses send invoices as PDFs via email, but less than 20% dispatch structured e-invoices through Electronic Data Interchange (EDI). Major suppliers are either willing or obliged to transmit electronic files in the format preferred by their customers, establishing connections on an individual basis. These suppliers do not show a preference for any particular network, being part of many.
+ Over half of the invoices are still received in unstructured formats, such as paper or PDF, making the extraction of data from machine-readable PDFs increasingly popular.
+ Supplier portals have been established.
+ Commercial Cards, including purchasing cards, ePayment, and virtual cards, are extensively used for high-volume, low-value purchases, with a moderate trend of increase and expansion into high-value transactions.
+ The use of third-party services, such as e-invoicing networks or Software as a Service (SaaS) platforms, is growing, offering substantial cost savings over significant in-house investments.
+ There is a noticeable trend towards invoice financing and novel payment solutions.

It is important to note, however, that the majority of U.S. businesses employ fewer than 500 people, and their practices and preferences are not adequately represented in findings as mentioned above. Should the market trends align with those in other countries, a significant surge in the adoption of third-party cloud services is anticipated.

Outside of North America, tax authorities and the public sector play a significant role in driving e-invoicing adoption, a trend not as prevalent in North America despite the U.S. Federal Administration's previous announcement of an e-invoicing mandate. Following a pilot program that evaluated the advantages and feasibility of e-invoicing within the public sector, the Office of Management and Budget issued a directive for federal agencies to transition to electronic invoicing. The goal was for these agencies to start processing all invoices electronically by the end of the 2018 fiscal year. Although digitalization has begun within federal administration, it has yet to significantly influence B2B e-invoicing as seen with B2G mandates in Europe.

To facilitate the increase in B2B efficiency, the Federal Reserve initiated a program aimed at boosting e-invoice adoption across U.S. businesses of all sizes. This initiative led to the establishment of the DBNA.

The market evolution in Canada mirrors that of the U.S.

### 4.2.4 Latin America

Chile is recognized as the foundational model for market development in Latin America, serving as a pivotal influence on regional market structures. Brazil and Mexico, as early adopters, have seen some markets surpass Chile, attributed to their rigorous enforcement of electronic invoicing regulations. Concurrently, the vast majority of Latin American nations are undergoing swift evolution in this arena.

The **Argentine** tax authority, AFIP, instituted a compulsory e-invoicing mandate across all economic sectors in the spring of 2019, marking a significant shift towards the obligatory widespread adoption of e-invoicing through the Electronic Invoice Issuance System (RECE) from April 2019.

**Brazil** mandates e-invoicing for all businesses, with approximately 2.1 million entities issuing e-invoices for goods, a testament to the effective implementation of these requirements years prior. Brazil's innovation extends to retail users through the NFC-e project, offering an electronic solution alternative to traditional fiscal printers. This project aligns with Brazil's broader commitment to electronic reporting and auditing, increasingly incorporating comprehensive tax-relevant documentation and operational tracking.

**Chile** was and still is a very innovative country. After several years of following a voluntary approach, the tax authority meanwhile declared electronic invoicing as mandatory for all businesses. Where it is not uncommon to declare the issuance of e-invoices, Chile is more advanced than the average also to consider the receipt of e-invoices. In 2018, the government also launched an innovative mobile app that permits the issuance and validation of e-invoices.

**Bolivia** initiated its VAT e-invoicing rollout in 2021, with successive taxpayer groups being incorporated in 2024 and 2025.

**Colombia** began its e-invoicing mandate for large businesses in 2018, entering a transitional phase in 2019-2020, culminating in a requirement for all businesses to issue pre-validated electronic sales invoices from August 2020.

**Mexico** leads globally in the digitization of tax-relevant processes, exchanging approximately 10 billion e-invoices annually. It has expanded its digital efforts to include mandatory e-accounting for businesses and individuals, significantly reducing tax evasion through comprehensive digital tracking and reporting.

**Peru's** approach to e-invoicing aligns with international standards, facilitating integration with European Union and APEC trading partners. Its system resembles Brazil's, incorporating shipping documents into its electronic invoicing process.

In **Latin America**, governmental initiatives primarily drive market activities towards e-invoicing, aiming to reduce tax evasion through immediate or near-immediate invoice validation. Despite stringent legal requirements, several Latin American countries have emerged as global leaders in e-invoicing adoption, inspiring nations abroad.

Key characteristics of electronic invoicing practices within Latin American countries include:

+ Mandatory allocation of unique and sequential invoice numbers (folios) by the tax authorities.
+ Utilization of digital signatures, authenticated through certificates issued by recognized or government-operated Certification Authorities.
+ Enforcement of standardized XML formats for obtaining clearance from the tax authorities.

- Compulsory submission of reports to the tax authorities, which must be done in real-time before the invoice is issued or, at the very least, on a monthly basis.
- Inclusion of traditional invoices and other fiscal documents such as credit notes, debit notes, and receipts (also referred to as 'boletas de ventas' or 'tickets') in the e-invoicing system.
- Enhanced integration with the physical supply chain, including the simultaneous printing of auxiliary transportation documents based on a pre-authorized invoice.
- Upon reviewing and approving suppliers' invoices, tax authorities may apply a visible 'stamp' on the generated PDF invoices. This 'stamp' could be a country-specific alphanumeric code or a barcode/QR code. Alternatively, a verifiable electronic token, such as a digital signature, might be added to the structured invoice file.
- Invoice recipients are frequently required to verify that the invoice has been pre-approved by the tax administration.
- Tax authorities either validate invoice data in real-time or employ data-mining techniques for subsequent invoice verification.
- A general requirement for the archiving period of invoices is set at five years.

Service providers play a crucial role in facilitating these regulated functions, with many operating across multiple Latin American countries and processing significant invoice volumes. These providers not only comply with local regulations but are also expanding into the American and European markets.

### 4.2.5 Europe

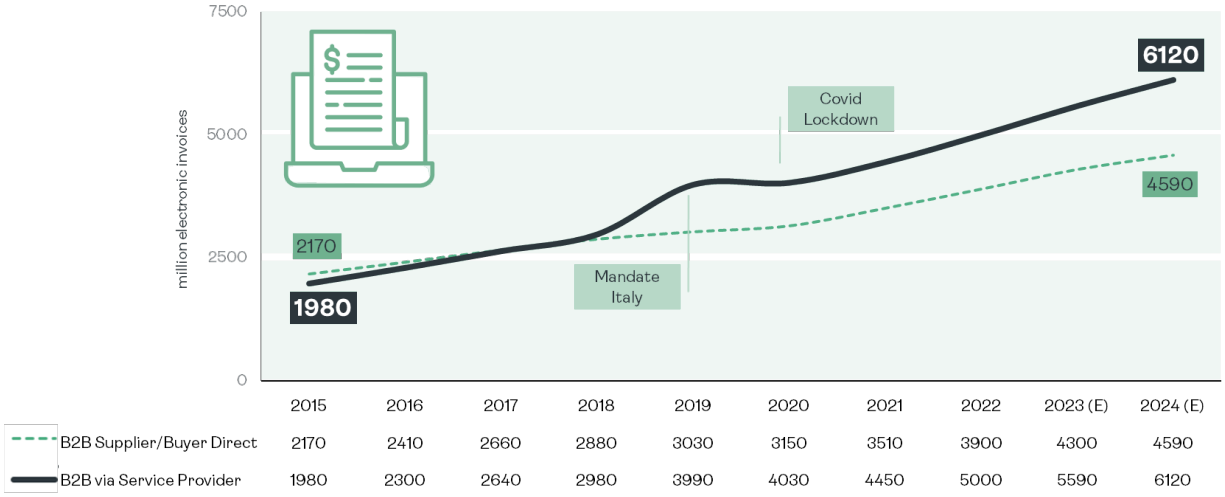
At the turn of the millennium, legislative frameworks across nearly all European nations had already embraced electronic invoicing, leading to an accelerated adoption of e-invoicing by businesses, surpassing adoption rates in other global regions.

European Union regulatory bodies primarily focused on eliminating legal barriers to e-invoicing, initiating standardization projects, establishing the Peppol interoperability framework, and advancing Business-to-Government (B2G) e-invoicing. In this context, approximately 300,000 public entities were mandated a few years back to upgrade their systems and workflows in order to accommodate standardized e-invoices. Subsequently, several nations have progressed to mandating e-invoicing for transactions with the public sector by suppliers.

Current developments like ViDA are aimed at combating VAT fraud within the EU through future reporting of invoice data to tax authorities. This measure also seeks to streamline business processes for taxpayers across a diverse and international context, a notable challenge given the distinctive composition of the European market. The complexity of the European market is underscored by its:

- Over 40 countries, including 27 European Union members,
- More than 40 legal frameworks,
- Over 100 languages, and
- In excess of 22 million Small and Medium-sized Enterprises (SMEs).

The fragmented market structure has posed significant challenges for companies, leading to a preference for utilizing cloud services or external service providers for e-invoice processing and Business-to-Business/Government (B2B/B2G) exchange. Currently, approximately 1,000 service providers are operational within Europe, handling over more than half of all B2B/B2G e-invoice transactions. The volume of e-invoices processed through these providers has seen a higher growth rate than direct data exchange for about the past five years, a trend expected to notably increase in the forthcoming years.

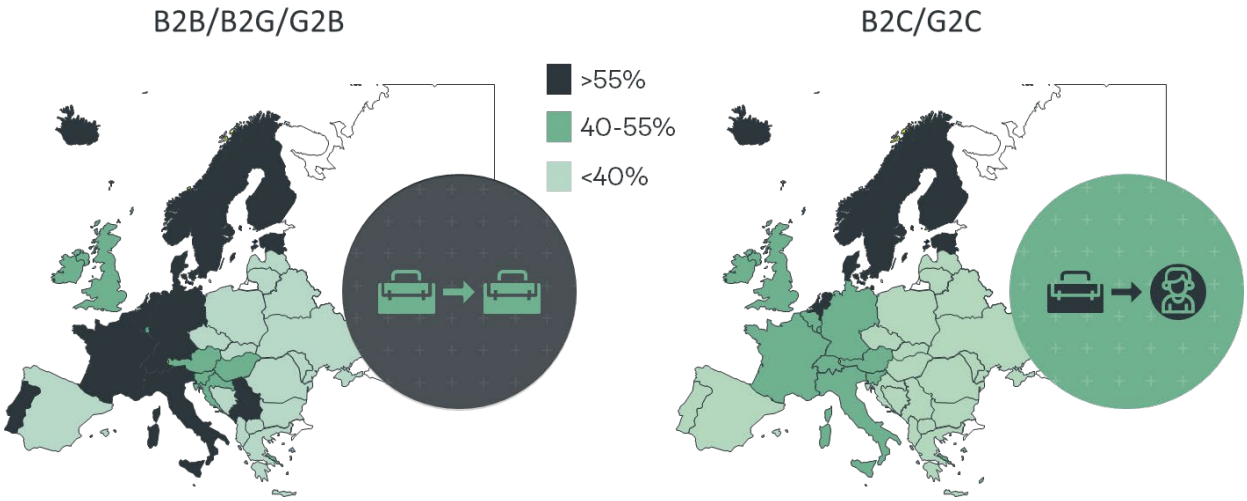



| | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 (E) | 2024 (E) |
|---|---|---|---|---|---|---|---|---|---|---|
| B2B Supplier/Buyer Direct | 2170 | 2410 | 2660 | 2880 | 3030 | 3150 | 3510 | 3900 | 4300 | 4590 |
| B2B via Service Provider | 1980 | 2300 | 2640 | 2980 | 3990 | 4030 | 4450 | 5000 | 5590 | 6120 |

Regulatory bodies aim to safeguard the investments made by taxpayers and service providers while accommodating the current landscape. Their initiatives significantly contribute towards achieving mutually beneficial outcomes for both tax authorities and taxpayers. There are established standards for electronic invoicing and interoperability networks for the transmission of business messages such as GENA and Peppol have been operational for some time already. The pan-European project ViDA (VAT in the Digital Age) marks a significant step forward in advancing intra-community electronic invoicing and tax reporting.

The market harmonization through community projects is a gradual process. Consequently, several European nations have leveraged their flexibility to either adopt or are in the process of adopting legislative measures for electronic invoicing and reporting for domestic transactions.

Our database provides valuable insights into the adoption rate of paperless invoicing in European countries for the year 2024:




In addition to this current status, the outlook for the coming years should be more interesting:

**Belgium** has enacted a comprehensive B2G e-invoicing mandate, with a B2B mandate scheduled for 2026. Similar to practices in other European countries, businesses are required to prepare their systems for receiving and issuing structured e-invoices. While an e-reporting requirement for invoice data is not yet planned for this phase, it is expected to be implemented by the time the ViDA deadlines are established.

In **France**, a complete B2G e-invoicing mandate has been implemented across all governmental levels, with the initial phase of a B2B mandate set for 2026. By Q4, all French companies should be capable of receiving e-invoices, with large and mid-sized companies also issuing them. The obligation extends to small and micro businesses in 2027. The e-reporting of invoice data is an integral part of the B2B mandate from its inception, rolling out with the same deadlines.

**Germany** has B2G e-invoicing mandates targeting the federal administration and the majority of the states. A B2B e-invoicing framework was adopted as part of the Opportunity Growth Act in the beginning of 2024. Starting in 2025, all businesses must be 'e-invoicing ready' to receive and process e-invoices in a structured format based on the European Norm. From 2027, companies with revenues exceeding 0.8 million euros, and from 2028 all businesses, will be required to issue structured e-invoices. The timeframe for the tax reporting of invoice data is to be determined later, most likely aligned with the ViDA deadlines.

**Italy** stands as the pioneer in European B2G e-invoicing, having mandated B2G e-invoicing across all governmental levels for nearly a decade. Since 2019, the B2B mandate has been progressively implemented, now encompassing the majority of businesses for both issuing and receiving e-invoices. The government employs a centralized pre-clearance model.

**Poland** has had an electronic reporting model for invoice-related data for several years. The initiation of a comprehensive B2B mandate was initially slated for 2024 but has been postponed to February 2026 for taxpayers whose turnover exceeded PLN 200 million in the previous year and to April 2026 for all remaining taxpayers.

**Romania's** e-invoicing system necessitates the pre-clearance of B2B e-invoices via the central government platform. The first half of 2024 serves as a transitional phase for the invoicing mandate in the form of e-reporting, with the RO e-invoice system becoming fully operational for sending and receiving invoices in July 2024, eliminating the acceptance of paper invoices for tax compliance.

**Spain** has implemented a nationwide B2G e-invoicing mandate. Previously, the tax authority introduced the SII electronic invoice data reporting system for both issuers and recipients. A B2B e-invoicing mandate is under consideration, with a draft law already in circulation. In the initial phase, businesses with revenues exceeding 8 million euros will be implicated, followed by all other taxpayers 12 months later, with a potential start in the summer of 2025.

The **UK** maintains a comparatively liberal market, allowing the private sector to evolve the electronic invoice market. Until 2019, the development in the B2G sector aligned with EU strategies, with central government departments supporting the EN16931 e-invoice standard and the National Health Service adopting the Peppol interoperability framework. The 'Making Tax Digital' initiative aims to digitize the tax system, requiring digital record-keeping and the use of compliant software, thereby narrowing the tax gap and bringing tax reporting closer to real-time.

Additionally, several **smaller European countries** are adopting or planning to implement B2G and digital record-keeping requirements within the next three years.

### 4.3 Market Predictions for 2024-2028

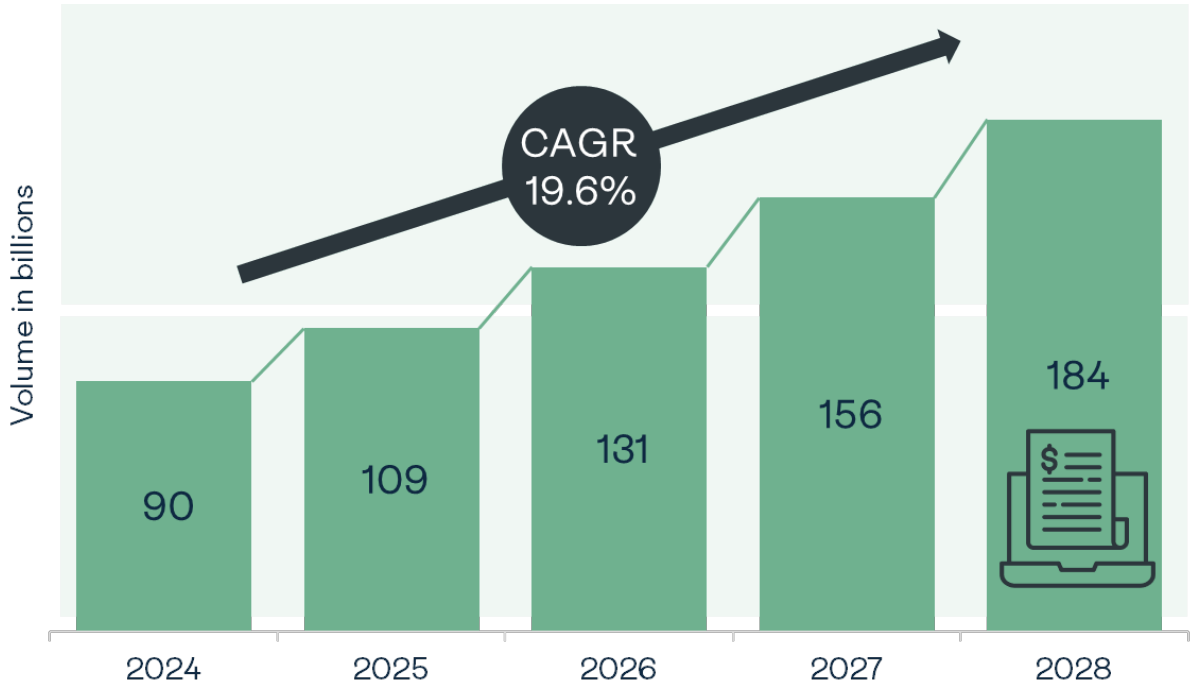
#### 4.3.1 Expected E-invoice Volume Growth

In light of the accelerating market dynamics within several major Asian countries, we recognize that the integration of electronic Point of Sale systems and mobile invoicing solutions (e-receipts) is set to substantially increase transaction volumes in the coming years. This surge is anticipated to significantly affect overall metrics, with projections suggesting that global e-receipt volumes may equal those of e-invoices by 2027. Predominantly, this expansion is expected to occur within the Business-to-Consumer (B2C) sector, although notable growth is

also anticipated in the Business-to-Business (B2B) space. The anticipated growth in the B2B sector will primarily be propelled by forthcoming regulations already disclosed in approximately 40 countries globally.

Due to the absence of qualified and localized projections for e-receipt volumes, we are currently unable to provide precise forecasts for this category and will instead continue to concentrate on traditional e-invoices.

With respect to e-invoices, we anticipate the following **global volume trends**:




### 4.3.2 Increasing Value of the E-invoicing Market

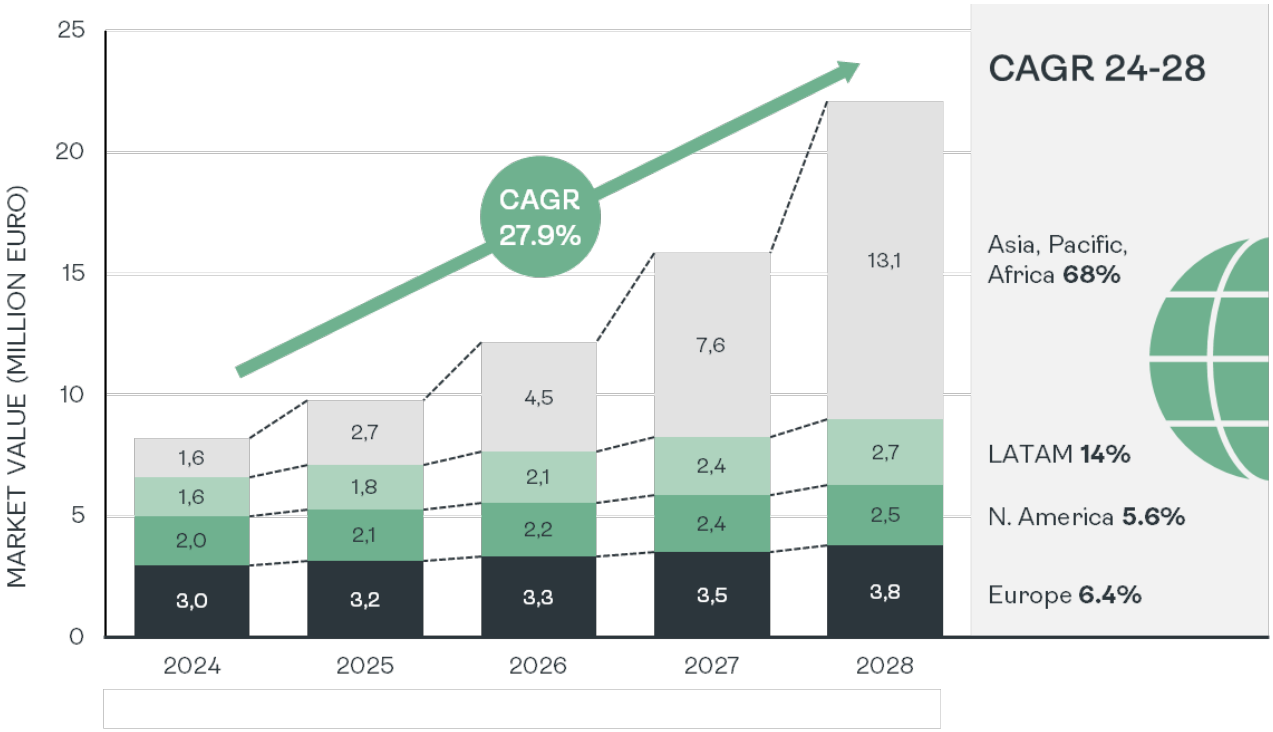
The electronic invoicing sector has established itself over the past two decades, with digital documents progressively supplanting traditional paper invoices. Initially, the growth of the e-invoicing market in Europe was predominantly spearheaded by the private sector. Subsequently, it expanded on a global scale, particularly within high-volume industries. Presently, the expansion is primarily driven by an increasing mandate from governments worldwide for organizations to adopt electronic invoice exchanges. Notably, Latin America leads in this adoption, with significant progress also observed in various European and Asian countries. This global trend is accelerating the growth of the market for e-invoicing solutions and integration services, fuelled by additional governmental requirements.

**billentis estimates that the size of the global e-invoicing and enablement market in 2024 is EUR 8.3 billion (USD 8.9 billion), and that it will reach approximately EUR 22.2 billion (USD 23.7 billion) in 2028 (CAGR 27.9%).**

It is projected that by 2028, numerous nations in Asia and Europe, will have implemented a CTC model. Generally, this will involve requiring the exclusive use of electronic formats for domestic business-to-business (B2B) invoice exchanges. Furthermore, it is anticipated that a substantial portion of previously generic receipts will be upgraded to comprehensive invoices. This forecast encompasses solutions and services directly associated with e-invoicing, as delineated in this analysis, including but not limited to exchange networks, communication gate-

ways, Software as a Service (SaaS), Platform as a Service (PaaS), initial setup costs, and directly related value-added services such as data validation, formatting, and synchronization. It is important to note that this projection excludes workflow or archival solutions and the processing of invoice-related data (e.g., purchase orders, catalogues, sourcing, and payment).

Looking ahead, the solution and service market for electronic invoicing and tax reporting presents a lucrative opportunity with steady growth potential in the forthcoming years. However, it is crucial to acknowledge that **market values and growth rates** significantly vary across different global regions:




Asia, Africa, and Latin America are projected to experience the highest annual growth rates. Currently,

Europe has the largest market value, but annual growth rates are expected to be only single digits until 2028. This moderation in growth can be attributed to Europe's already mature market conditions. Additionally, a significant factor is the potential decrease in transaction prices, given that the current average cost of transmitting an e-invoice in Europe is substantially higher than the global average. This discrepancy arises from Europe's highly fragmented market, characterized by a multitude of small-scale providers primarily serving national markets, and the diversity in languages, legislations, and standards. Conversely, jurisdictions adopting CTC models and mandatory e-invoicing regulations benefit from a standardized approach, which results in a larger share of electronic invoices and facilitates economical and efficient interconnectivity between e-invoicing network operators. Consequently, the average cost per e-invoice in countries with CTC models is significantly lower, typically in the low two-digit Euro cents range.

In regions such as LATAM and Asia, mandates for e-invoicing have been either implemented or announced, predominantly based on simpler CTC models. However, the revenue from transactions for solution providers began at a modest level due to the typically brief implementation timelines, leaving the optimization of business process automation for the entire trading cycle far from realized. Therefore, solution providers in these areas still possess substantial opportunities for additional revenue. Looking ahead, it is anticipated that they will enhance transaction revenue per e-invoice by delivering added value.

# 5. Successful Implementation of E-invoicing and Integrated Digital Trade Projects

## 5.1 Holistic Assessment of Existing Prerequisites

The exchange of invoices without paper is legally authorized in the vast majority of countries globally. This enables organizations to adapt their internal frameworks and automate their operations. The strategy for implementation is influenced both by the organization's internal objectives and capabilities, and significantly by external factors.

This section aims to provide insights that will assist readers in effectively establishing or advancing their electronic invoicing and Integrated Digital Trade initiatives.

An essential initial move is to conduct a comprehensive evaluation of the current situation and needs across several areas:

+ Internal organizational and technical landscape
+ Digital collaboration with business partners
+ Regulatory requirements and compliance

### 5.1.1 Asses your Internal Organizational and Technical Landscape

In the context of large organizations, our observations have highlighted the diverse nature of customer environments, characterized by a multitude of challenges such as:

+ The presence of numerous, disparate ERP systems.
+ Decentralized processes for the issuance and receipt of invoices.
+ Lack of control and oversight over paper invoice workflows.
+ Absence of transparency in invoice processing streams, volumes, and methodologies.
+ Multiple decentralized long-term archives.
+ Ambiguity regarding the identification of original invoices versus copies.
+ Concurrent, yet isolated, initiatives across departments focused on scanning, workflow management, archiving, tax compliance and electronic invoicing.

Early adopters embarked on their journey toward electronic invoicing without a comprehensive long-term strategy. Subsequently, post-implementation, the responsibility shifted to IT departments for ongoing operational management.

Frequently, major trading partners mandate specific formats for business communications, funnelled through designated service providers. Similarly, tax regulations in various jurisdictions necessitate the use of accredited service providers for invoice data submission. Historically, IT departments have rapidly and pragmatically responded to new business and tax reporting mandates, leading to the proliferation of diverse solutions, services, and processes.

+ **Our analysis indicates that many multinational corporations engage with 3 to 20 distinct electronic invoicing service providers for incoming invoices. The scenario is more fragmented on the outgoing invoice and tax reporting front, with organizations navigating between 20 to 160 different platforms, services, and portals.**

Managing this complex web of heterogeneous solutions and processes poses a significant challenge in change management. Global entities are required to incorporate hundreds of new requirements annually into their systems and workflows. For medium-sized businesses, particularly those with international engagements, maintaining tax-compliant systems and processes is becoming increasingly untenable.

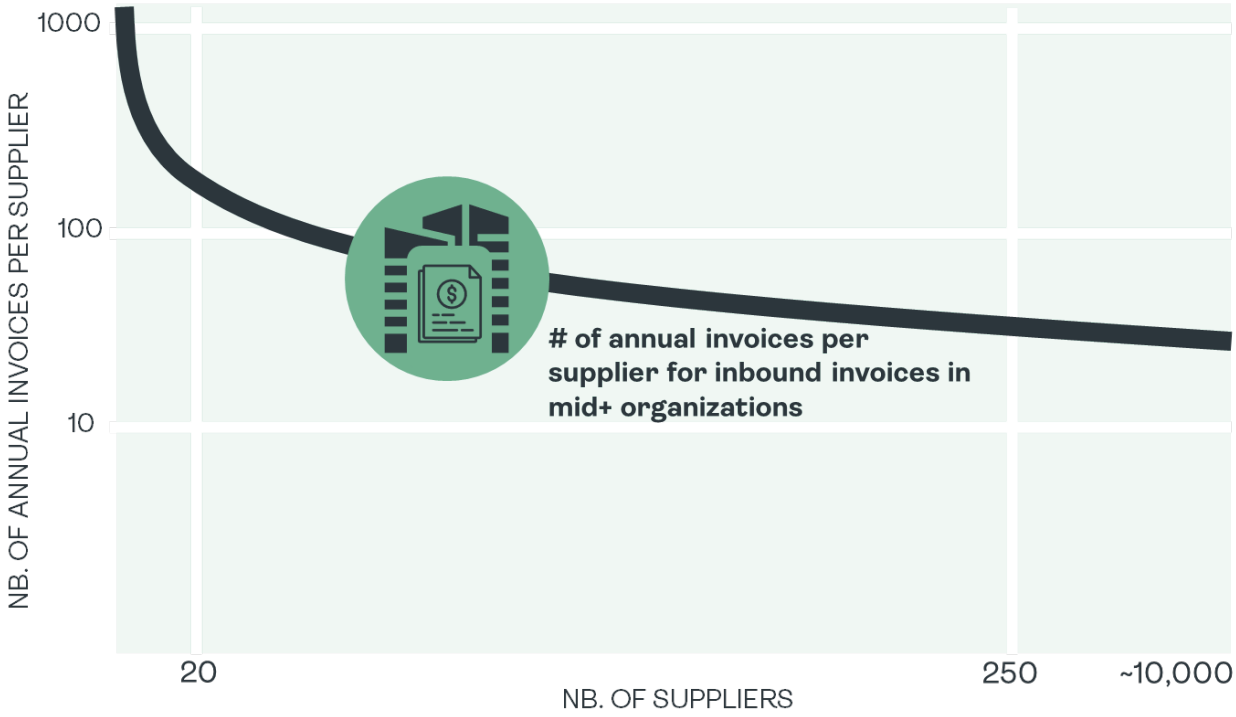
**The deluge of new mandates is expected to continue, underscoring the need for organizations to re-evaluate their existing fragmented infrastructures to align more closely with future demands. Electronic invoicing and tax reporting should be viewed not as a project with an end date but as an ongoing journey towards full Integrated Digital Trade.**

From our consultancy perspective, we have observed that many organizations' solutions and process frameworks are not ideally positioned for future challenges. We recommend a proactive assessment and strategic realignment towards the automation of Integrated Digital Trade to ensure readiness for upcoming developments.

### 5.1.2 Digital Collaboration with Trading Partners

To enhance digital collaboration with trading partners, it is imperative to assess their capabilities and constraints.

While the Pareto Principle (80:20 rule) holds validity across various sectors, it does not generally apply to invoice flows, with rare exceptions in certain industries. A more representative scenario for inbound invoices in medium to large organizations is as follows:




Typically, between 20 to 50 suppliers issue over 100 invoices annually. Around 1,000 suppliers may send between 10 to 100 invoices yearly, whereas the vast majority dispatch fewer than 10 invoices. Large corporations usually engage with approximately 10,000 suppliers and, depending on their product portfolio, a significant number of customers. Most of these suppliers and customers are small and medium-sized enterprises (SMEs) characterized by a highly fragmented IT infrastructure, with limited abilities in structured invoice data exchange and electronic archiving. Furthermore, these entities may operate across different jurisdictions, each with its unique legal requirements for tax-compliant invoicing, archiving, and adjustments for language and cultural differences.

The success of e-invoicing initiatives heavily depends on a thorough consideration of the trading partners' contexts. This includes identifying their motivations and facilitating their VAT-compliant connection in a straightforward manner.

While large entities often seamlessly incorporate electronic invoicing into their systems, the needs of small and medium-sized businesses may vary.

Requirements of organisations:

| Size | Issuer requirements | Recipient requirements |
|---|---|---|
| **Large** | + Full ERP integration<br>+ Two-way communication<br>+ Cloud archive (sometimes shifted to inhouse in step 2) | + Full ERP integration<br>+ Two-way communication<br>+ Cloud archive (sometimes shifted to inhouse in step 2) |
| **Medium** | + Full ERP integration<br>+ Export tools (CSV, ...)<br>+ Cloud archive | + Full ERP integration<br>+ Import tools (CSV, ...)<br>+ Cloud archive |
| **Small** | + WebEDI (type in invoice on a portal)<br>+ Electronic forms<br>+ PDF (including several layers with image, XML data and other features)<br>+ Cloud archive | + Browser presentation & download, e.g. via home banking<br>+ PDF (including several layers with image, XML data and other features)<br>+ Cloud archive |

### 5.1.3 Legislation and Compliance

The evolving landscape of compliance and the requisite electronic submissions to tax authorities are increasingly becoming predominant. Such requirements for tax reporting are progressively being integrated with B2B e-invoicing mandates. The objective of tax authorities in developed nations is to fully digitize all documents and procedures pertinent to taxation.

For the purpose of automating business processes, organizations utilize over 150 messages, of which approximately 30 have fiscal significance and are, eventually, required for digital submission to tax authorities. A majority of business operations are either directly or indirectly influenced by tax and audit regulations. Consequently, various items listed in the forthcoming chart may be targeted for digitization and data exchange Continuous Transaction Control (CTC) models.

The digitization process encompasses numerous aspects of business, significantly impacting the handling of tax-relevant documents:

The anticipated evolution of compliance and tax requirements is set to encompass a wide range of fiscal documents, including but not limited to invoices, payments, payment receipts, credit notes, debit notes, waybills, and monthly salary statements. Below is a comprehensive overview of the expected developments:

+ The entire lifecycle of invoices, from issuance to settlement, will be subject to meticulous tracking and tracing.
+ There is an anticipated transition from periodic post-audit reporting mechanisms towards the implementation of real-time electronic Continuous Transaction Controls (CTC) systems.
+ The obligation to participate in the electronic cycle is expected to extend to buyers, marking a shift from initial regulations that primarily targeted suppliers. This change is already being observed in multiple jurisdictions.
+ Mid-term directives will also encompass cross-border invoicing, as demonstrated by the European Union's ViDA project.
+ The scope of regulatory oversight is poised to expand to include inventory reporting, ensuring seamless integration with the physical supply chain. This entails tracking and tracing supplies from their point of entry into the domestic market or production phase through to their sale and correlating this data with Integrated Digital Trade documentation such as invoices.
+ Tax authorities in several jurisdictions are mandating that businesses utilize only accredited service providers for CTC reporting or message transmission to trade partners.

Despite potential initial hesitations regarding the adoption of an e-invoicing and e-reporting CTC model, the benefits to taxpayers are significant:

+ The use of e-invoices within CTC models is shown to reduce tax compliance costs by 37-39% for corporate businesses and by 8-56% for private businesses, compared to traditional paper invoicing. This efficiency gain encourages the adoption of e-invoice initiatives by multinational corporations.
+ The process's legal robustness is enhanced by mechanisms ensuring the authenticity of documents and preventing the repudiation of origin, thus reducing the risk of fraud.
+ Compared to legacy post-audit systems, real-time compliance verification significantly lowers the risk of penal fines that could be levied years after the transaction.
+ Automation replaces manual and periodic reporting, eliminating the need for VAT declarations and deductions and enabling automated collections and refunds. This transition also leads to a substantial reduction in paper-based documentation.
+ The implementation of these systems significantly narrows the VAT gap, setting the stage for potential reductions in future tax rates.
+ It promotes the establishment of unified messaging standards nationwide, minimizing heterogeneity.
+ Additionally, it simplifies or eliminates issues related to interoperability among service providers and accelerates widespread market adoption, significantly reducing transaction costs compared to fragmented, bottom-up market developments.
+ This regulatory environment fosters the emergence of innovative invoicing and trade finance mechanisms.

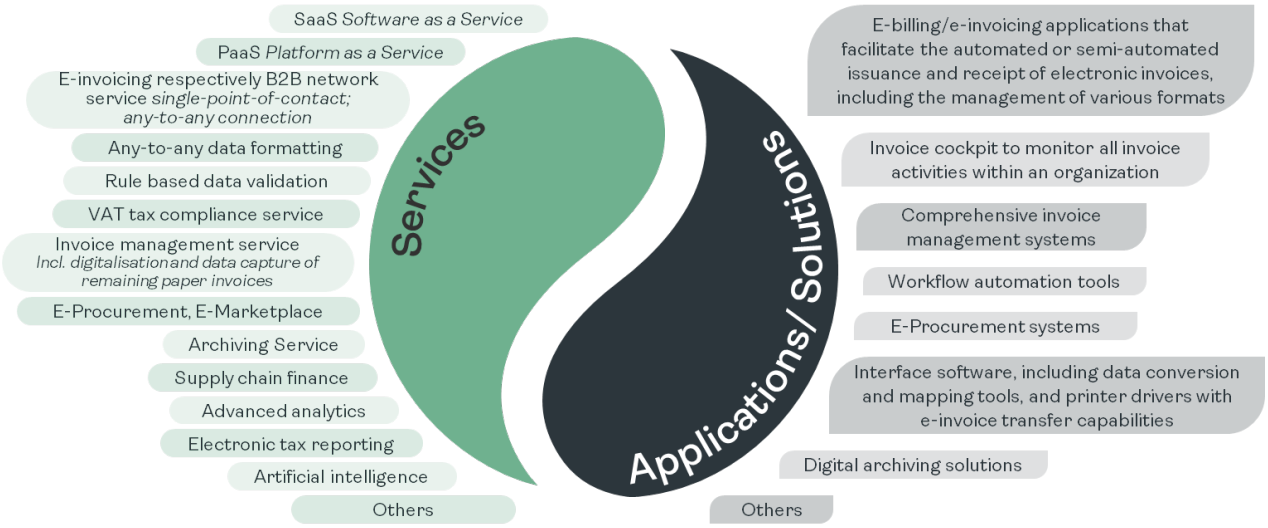
### 5.2 Impact of Third-Party Solution Offerings and related Technology Trends

Pursuing in-house development has become increasingly impractical for multiple reasons:

+ The feasibility of a favourable business case is diminished due to substantial initial and ongoing project costs.
+ The process is overly time-intensive.

- There is no justification for creating solutions that are readily available and operational through numerous solution providers.
- Regulatory mandates from many governments necessitate the use of accredited service providers for e-invoice transmission. Moreover, key trading partners may stipulate the use of specific service providers for electronic invoice and business message exchanges, rendering the use of a service provider obligatory.

Consequently, the viable alternatives are the acquisition of third-party applications or the adoption of external cloud services. The selection between services and applications/solutions entails:




The decision-making process for selecting the appropriate scenario hinges on:

- The organization's Make or Buy policy
- The existing IT and processing environment
- Invoice volume
- The overarching business case
- Internal operational requirements
- The requirements and capabilities of business counterparts

Typically, larger organizations evaluate 2-3 scenarios, conduct comparative analyses, and finalize their decision. This decision-making process is followed by issuing a Request for Proposal (RFP) to 2-4 potential providers.

## 5.3 Comprehensive Strategy Encompassing Entire Scope of Objectives

### 5.3.1 Internal Objectives

The internal goals and requirements can be delineated and executed with a significant degree of autonomy. The following domains, among others, may serve as focal points for setting objectives:

- **Integrated Digital Trade**: This extends well beyond simple automation of invoice processes to encompass all pertinent activities before and after source-to-pay and order-to-cash processes. Based on our experience, foundational elements often need to be established in a preliminary project, especially in terms of maintaining an accurate database for trading partners and products. Master data cleansing becomes a necessary step in many instances. Streamlined processes are crucial for adding new trading partners, and efforts should be made to eliminate or synchronize redundant data across different systems in real-time.

- **Enhancement of Working Capital**: Automation of invoices plays a critical role in this area. Electronic invoicing facilitates the reduction of exceptions, expedites processes, enables discount utilization, lowers days sales outstanding (DSO), enhances cash management transparency, reduces capital expenditure, and supports the use of Supply Chain Finance.

- **Environmental, Social, and Governance (ESG)**: The shift towards electronic invoicing can be strategically employed to improve ESG reporting and performance.

- **System and Process Harmonization**: Aim for a fully digital internal transition through suitable initiatives.

- **Future-Ready and Agile Solutions and Process Design**: Adapt to existing and potential future legal mandates as well as real-time interactions with tax authorities and trading partners, which are essential for future solution frameworks. Characteristics such as platform openness, agility, interoperability, and the adoption of new technologies are vital. Despite the difference from the current and organically developed environment, these elements should not deter preparations for the future. It may be necessary to overhaul existing internal systems and processes to stay ahead.

When outlining the strategy, the following inquiries may emerge:

- Do we aim to automate solely the invoicing process, or should we extend this to include purchasing, the complete procurement, and the sourcing process?
- Is our goal to initiate with the order-to-cash or purchase-to-pay automation?
- What strategies do we have to prevent or minimize the existence of parallel systems and processes in business process automation and tax reporting?
- Which company divisions, systems, and processes will this project impact, and how can we transition from existing solutions?
- How should B2B networks and other cloud services be integrated into our approach?

### 5.3.2 Improve Digital Collaboration with Trading Partners

Strategic considerations Influencing the business direction:

- The necessity for compliance with the stringent mandates set forth by principal trading partners, which may include the adoption of designated electronic marketplaces or B2B service providers.
- A rising demand among trading partners for the capability to facilitate the transmission of various business and trade communications.
- Enhancements in global interoperability to enable a seamless and cross-platform exchange of diverse business messages.
- The expansion of service provider operations internationally, with an increased scope of geographical coverage.
- The dichotomy in the service provider landscape, where numerous providers are interconnected, enabling the cross-platform sharing of messages, contrasts with the presence of several B2B solution providers now operating in upwards of 110 countries. For enterprises, the ideal scenario entails a unified point of contact managing all trade cycle transactions, both inbound and outbound. While feasible for businesses operating within a limited geographical span, even globally active entities should aim to consolidate their solution providers to approximately five.

### 5.3.3 Ensure Tax Compliance

Given the diverse nature of regulations and frequently tight timelines for implementation, navigating this domain presents significant challenges.

Outlined below are essential questions that organizations must consider prior to formulating a strategy:

+ Are we operating in jurisdictions that currently or will shortly adopt a Continuous Transaction Controls (CTC) model for invoices, receipts, and other fiscal documents or tax reporting?
+ Are we engaged in commerce within countries that currently or will soon require a Business-to-Government (B2G) or Business-to-Business (B2B) electronic invoicing mandate?
+ What measures can be taken to guarantee tax compliance within a global framework?

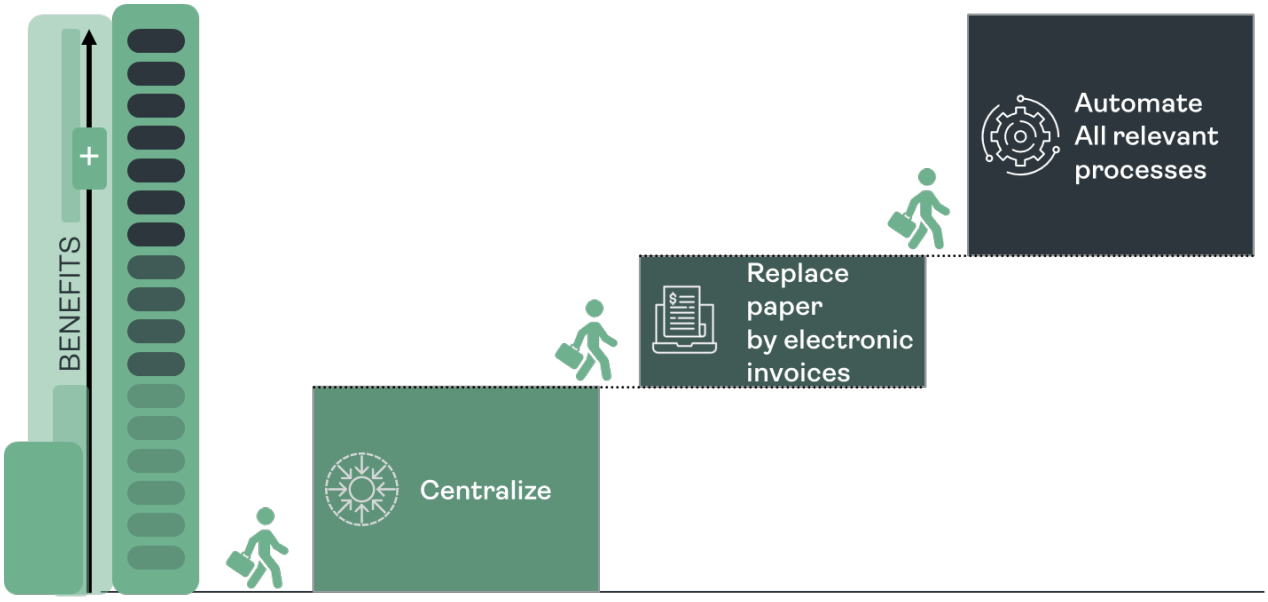
## 5.4 Implementation, Migration and Onboarding

### 5.4.1 Scenario for Gradual Internal Implementation

Approximately 30% of larger organizations continue to manage their invoices in a decentralized manner, frequently employing multiple ERP and accounting systems. Such a setup restricts financial managers from achieving comprehensive visibility regarding the quantity, total value, and status of invoices.

Adopting electronic invoicing typically establishes a centralized gateway for both sending and receiving invoices, significantly enhancing the transparency available to finance managers. This centralization is a crucial step towards optimizing working capital.

In a dispersed and extensive operational landscape, the greatest benefits are realized by adhering to these specific procedural steps:




OPTIMISATION STEPS IN LARGE ORGANISATION

Given that achieving this objective may be time-intensive (for example, requiring up to two years), an effective alternative involves migrating within a decentralized framework. If the limitations associated with future centralization are anticipated, they can be incorporated into the system and process planning and execution phases.

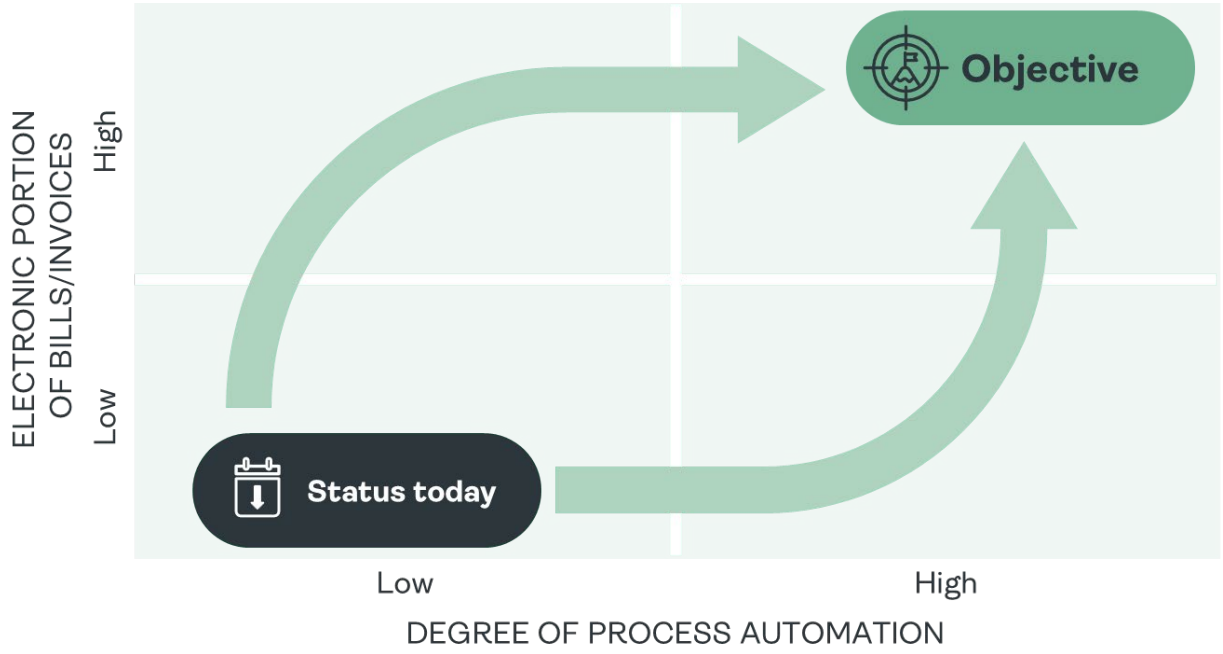
### 5.4.2 Determine the Best Scope for your Organisation

In approximately 50% of nations, the implementation of electronic invoicing is optional, yet legally sanctioned. For the majority of organizations, transitioning to e-invoicing represents the

initial step towards achieving an Integrated Digital Trade framework. This underpins the rationale behind many organizations prioritizing e-invoicing, often referred to as the 'Queen of messages'. Typically, initiating the digital transition with the invoicing message and subsequently expanding the electronic quotient within the organizational framework is considered a strategic approach (left arrow of next chart).

**Transitioning to electronic and automated processes is generally beneficial. Nonetheless, within most organizations, it is recommended to conduct a thorough review and refinement of current processes before implementation. It is often possible to eliminate up to 30% of legacy inefficiencies without sacrificing functionality.**

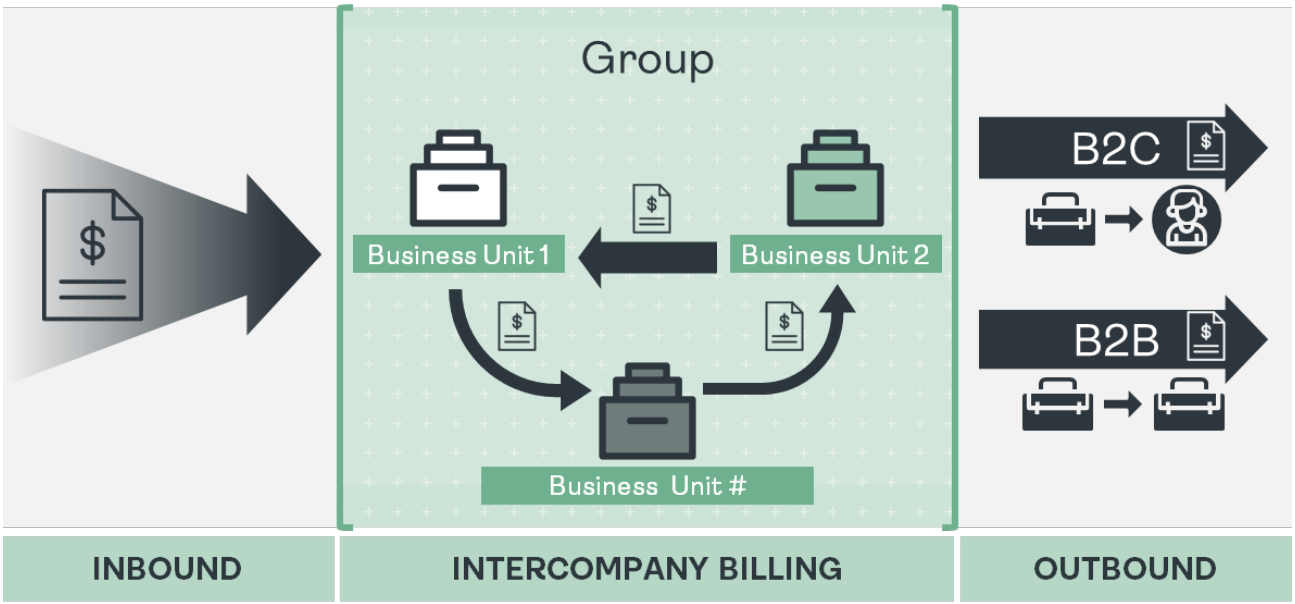
Determine the appropriate migration path to exploit the full optimization potential:




E-invoicing, in isolation, presents a compelling business case, offering tangible benefits. Nonetheless, the potential for additional future cost savings is amplified through the realization of a fully automated trade cycle. A secondary group of users seeks to extend digitization and automation beyond mere invoicing to encompass a broader spectrum of trade-related communications, such as orders.

The strategic approach to e-invoicing varies across organizations, influenced by the dominant nature and optimization potential of different invoice streams. It is advised that projects be aligned with these areas of potential.

Prioritizing Digital Transition of Invoice Streams:




**Inbound Invoices**: Organizations with substantial purchasing power may prioritize the digital transition of inbound invoices to leverage their position and encourage suppliers towards electronic invoice submission.

**Intercompany Billing**: The potential for optimization within intercompany billing is often overlooked. This stream offers complete control to the organization and, in scenarios where all entities are within the same tax jurisdiction, invoices can be efficiently processed electronically or through account transfers. In instances of diverse tax jurisdictions, adopting a standardized approach to electronic invoices, mirroring external processes, ensures authenticity, integrity, and readability.

**Outbound Invoices**: Organizations with a high volume of consumer transactions (B2C) have begun issuing electronic invoices directly. Despite this, widespread adoption remains modest; achieving a 60% client utilization rate is deemed successful, with most organizations reaching only 45-60%, and the highest performers achieving 85-97%.

To enhance electronic participation, organizations should consider implementing an opt-out model and/or leveraging networks (e.g., online banks or other popular consumer portals) for distribution. The use of PDF invoices, transmitted via email or portals, has gained popularity, with some organizations advancing by adopting push methods over portal-based strategies. This approach is equally applicable to B2B invoices for smaller entities, where PDF invoices transcend mere paper replicas by incorporating structured (XML) data layers and enabling dynamic interaction functionalities (e.g., dispute resolution, payment options) within the documents. E-invoices are crafted to comply with VAT regulations, including digital signatures for crucial sections, verification processes, and, occasionally, provisions for long-term online archiving.

### 5.4.3 Stricter Internal Data Accuracy Mandated to Meet Tax Obligations

#### 5.4.3.1 Compliance Challenges

In response to the utilization of both lawful and unlawful strategies for tax optimization by numerous corporations, there is a heightened focus on tax compliance. The Organization for Economic Cooperation and Development (OECD) along with the G20 nations have consented to bolster the requisites for both reporting and ensuring the tax compliance of corporate documentation. This necessitates companies to furnish more detailed proof affirming the genuine

existence of their trading partners and that such corporate documents are indeed underpinned by tangible goods or services transactions. The current standards for the precision of invoices and associated business documents might no longer meet these enhanced requirements.

Enhancing the accuracy of invoicing can be achieved through the refinement of address information for both issuers and recipients, alongside all data pertinent to the transactions (goods and services).

One of the primary sources of Accounts Payable (AP) fraud includes the issues of phantom trading partners (non-existent corporate entities), undelivered supplies, and fraudulent invoicing.

Many of these obstacles can be surmounted by adopting measures aimed at the augmentation of data accuracy and the validation of this data in real-time or near-real-time. The deployment of artificial intelligence capabilities presents new avenues for the identification of fraudulent invoices. Employing electronic invoicing, predicated on precise data, establishes an excellent groundwork towards achieving these objectives.

#### 5.4.3.2 Accurate Addresses and Master Data

Ensuring tax compliance necessitates the veracity of both trading entities and the accuracy of their addresses, aligning with their business register entries.

The deployment of electronic IDs and digital certificates offers a method for the technical authentication and unequivocal identification of trading parties. These tools are being utilized in certain jurisdictions to achieve this purpose. However, such identification mechanisms do not inherently assure the alignment of invoice issuer and recipient addresses. Instead, alignment can be achieved through the synchronization of master data with authorized registers, such as national business registers, which are commonly established for internal governmental use but may require modifications prior to the implementation of CTC systems. Furthermore, the creation and maintenance of public sector directories at various governmental levels are advocated, although access to these directories is often restricted to protect privacy. Legislation may be revised to facilitate online access to these directories. For operational efficiency, these registers should support various structural specifications, including those for headquarters, branches, and subsidiaries. Upon meeting these conditions, market participants can employ lookup routines to dynamically synchronize essential elements of their master data within their Enterprise Resource Planning (ERP) solutions or within the directories of e-invoicing network operators.

While direct data synchronization between trading entities' systems remains crucial in high-volume industries, it is anticipated that, in the medium term, this could be augmented or substituted by synchronization with national registries.

#### 5.4.3.3 Accurate Product and Service Information

In accordance with compliance mandates, enterprises are required to substantiate that their business documents originate from legitimate transactions involving goods or services. This measure aims to deter tax optimization strategies such as over-invoicing, where the price of goods or services is artificially inflated, and under-invoicing, which involves reporting lower prices than actual, to evade proper tax liabilities.

Moreover, companies have a vested interest in ensuring that invoices accurately reflect the descriptions of goods or services provided. Particularly in the context of standardized or mass-produced goods and services within regulated sectors, it is feasible to align such information with a centralized database. An illustrative case is TARMED, which serves as a tariff framework within the Swiss healthcare sector, facilitating the verification of invoiced supplies against standardized data sets.

Nevertheless, a majority of enterprises operate within frameworks that are not as rigorously standardized. For these entities, viable solutions exist to enhance the precision of invoice data. The adoption of integrated purchase-to-pay systems that support catalogue data matching exemplifies such an approach.

The Global Data Synchronization Network (GS1 GDSN) stands as a notable initiative enabling trading partners to uniformly share product information on a global scale.

In Mexico, the adoption of the United Nations Standard Products and Services Code (UNSPSC) taxonomy by the 'Servicio de Administración Tributaria (SAT) for classifying goods and services has been instrumental in enabling the use of electronic invoicing since December 2017.

It is anticipated that data synchronization services will become increasingly pivotal in the foreseeable future. Currently, however, the predominant preference among organizations is to place orders and receive invoices electronically. In many instances, the details contained in these electronic documents can be automatically aligned, simplifying the process.

### 5.4.4 Designing and Implementing Agile Systems and Processes for Enhanced Efficiency

The regulatory landscape and digital requisites for trade partners are evolving rapidly and with increasing frequency. To effectively navigate these changes within the constrained timelines necessitated, it is imperative for systems and processes to exhibit a high degree of agility. Presently, we are witnessing a significant wave of innovation in systems, highlighted by the proliferation of services facilitating cross-border electronic invoicing and tax compliance. Moreover, the emergence of solutions leveraging cutting-edge technologies are becoming more feasible and financially accessible.

This evolution presents lucrative opportunities for enterprises. Nonetheless, it is critical for these entities to strategically realign their internal mechanisms and workflows to fully capitalize on the potential benefits, thereby advancing towards the complete automation of the Integrated Digital Trade.

Subsequent to optimizing the internal infrastructure, the enhancement of the electronic invoicing proportion introduces an additional complexity.

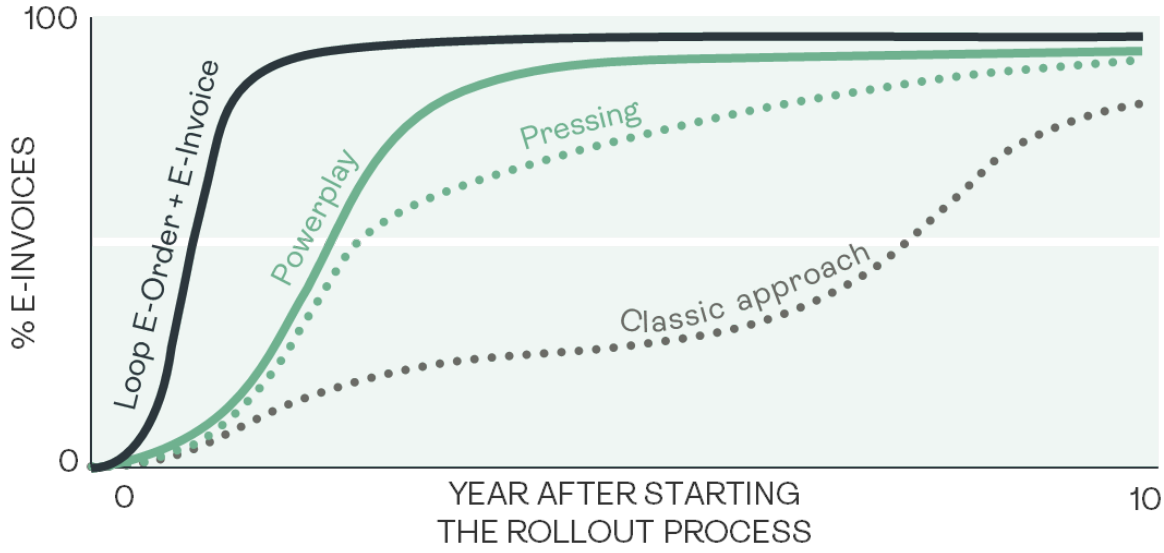
### 5.4.5 Initiatives to Boost the Adoption of Electronic Invoicing

A growing number of nations and governmental entities are mandating B2G and B2B electronic invoicing, inclusive of detailed requirements for structured exchange formats and frequently, the transmission channels. These mandates, necessitating comprehensive invoice content and incorporating tax reporting as an integral component, provide businesses with a solid foundation to automate their invoice processing.

Nevertheless, substantial regions across the globe remain where the implementation of advanced mandates that benefit both tax authorities and businesses alike is not foreseeable in the near term.

In several jurisdictions, mandates are limited to the electronic submission of sales invoice summaries. While the structured electronic data from the supplier is adequate for tax reporting purposes, it falls short in enabling buyers to automate their invoice processing workflows. In other regions, while electronic invoicing is legally acceptable, the decision to adopt e-invoicing and the choice of format rest with the trading partners.

The extent to which electronic invoicing can be adopted varies widely but can be significantly enhanced through strategic interventions. The success rate of adopting electronic invoicing is contingent upon the effectiveness of the onboarding methodologies employed.




| Phase | Description |
|---|---|
| Classic approach | Primarily, large corporations serve as the pioneers in adopting electronic invoicing, exerting influence on their substantial trading counterparts to embrace the exchange of invoices digitally. The approach of Opt-In onboarding is utilized, wherein efforts are made to persuade each entity individually to join the electronic invoicing community. However, for the majority of organizations, achieving a significant portion of electronic invoices with large trading partners plateaus at approximately 25-30% even after several years.<br><br>Subsequently, these pioneering large enterprises endeavour to extend their push towards mid-sized and small trading partners to adopt electronic invoicing practices. Despite intensifying marketing efforts, a large organization alone cannot dictate market trends. Their influence is contingent upon the overall market's maturity. Consequently, the annual growth rates of electronic invoicing adoption remain constrained.<br><br>This pattern of market evolution has been prevalent historically and continues to unfold in numerous countries to this day. Nonetheless, it has not led to a widespread breakthrough in the markets thus far. |
| Pressing | For most major corporations, attaining a minimum electronic invoice penetration of 60% within three years is feasible. However, this target is not achievable through passive or merely amicable strategies with trading partners. Instead, proactive engagement and strategic marketing efforts are essential to elevate the adoption rate of e-invoicing. Additionally, it is imperative to refine standard contractual terms to furnish a legal framework that compels trading partners to transition towards e-invoicing.<br><br>While the adoption strategy predominantly relies on assertive tactics, it remains a legitimate approach provided that the initiating company or its service provider extends suitable e-invoicing solutions that accommodate the diverse needs and sizes of trading partners under equitable terms. |

| | |
|---|---|
| | The process for registration and use should be streamlined to the maximum extent, aiming for minimal barriers to entry. For instance, initial engagement could be simplified to online registration, with each trading partner having a pre-assigned account that can be activated effortlessly with a single click, followed by the completion of their primary data.<br><br>An increasing number of prominent firms are adopting this strategic approach. |
| Powerplay | For the majority of large-scale enterprises, attaining a minimum of 80% electronic invoicing within three years is feasible. This is facilitated through the implementation of the 'Pressing' strategy, which incorporates penalties for parties that persist in utilizing paper invoices. Electronic invoicing is established as the standard mode of transaction, with penalties enforced for the issuance of paper invoices. The structure of these penalties is as follows:<br><br>+ Suppliers typically impose charges ranging from EUR 1 to EUR 3.50 on consumers and EUR 5 to EUR 25 on businesses for each paper invoice issued.<br>+ Buyers are inclined to deduct between EUR 15 and EUR 25 from the invoice value for each paper invoice received, particularly if the supplier is either unwilling or unable to facilitate electronic invoice transmission. |
| Closed electronic loop for orders and invoices | In numerous large organizations, a minimum of 40% of invoices are derived from Purchase Orders. These enterprises have the opportunity to transition receiving all PO-based invoices electronically within a few months.<br><br>Suppliers are eager to obtain purchase orders. Should the prospect arise for them to exclusively receive these orders through electronic means in the future, they are likely to swiftly embrace this new method of communication. Moreover, this approach also enables them to submit invoices electronically. Consequently, this paradigm fosters a rapid and mutually beneficial scenario for both suppliers and purchasers. |

Given the established facts, it is noteworthy that numerous organizations have yet to transition to more effective onboarding methodologies. The technique represents merely a fraction of the journey towards electronic invoicing. Far more critical to achieving success and a substantial digital adoption rate is the rollout strategy, specifically the onboarding of trading partners.

Different rollout models in use:

| | |
|---|---|
| **Opt-In** | An issuer or recipient enhances their electronic invoicing system. They notify their counterparts of this advancement, encouraging them to adopt electronic invoicing for sending and/or receiving invoices. Persuading each participant to transition to electronic invoicing requires robust arguments, incentives, and/or moderate pressure. While traditionally, a more congenial approach was employed to onboard companies, increasingly, the Opt-Out model is being favored where applicable. |
| **Opt-Out** | An issuer or recipient enhances their capabilities for processing electronic invoices and notifies their business partners of this new facility. They communicate that beyond a specified deadline, all invoice exchanges will be conducted electronically. Parties interested in maintaining traditional paper-based invoicing are required to formally request exclusion from this electronic process, potentially incurring a fee for opting to continue with paper invoices. |

| | |
|---|---|
| | The adoption of the Opt-Out model significantly accelerates the transition to high-volume electronic invoicing. This approach is viable for any large organization, particularly those that engage in regular transactions with a consistent group of partners, such as leasing companies, the transport and logistics sector, telecommunications, utilities, providers of credit and customer cards, office supplies, maintenance, repair and operations (MRO) goods, consumer packaged goods, online services, and communities utilizing extranets or standardized client software.<br><br>Presently, many issuers employing this model opt for signed PDF invoices, with or without accompanying XML data. This ensures immediate legibility for the recipient, although the advantages may be somewhat limited in the case of PDFs alone. |

Success rate for an organisation and the electronic proportion one year after launch

| Model | Electronic proportion of all invoices |
|---|---|
| **Issuer driven 'Opt-In'** | 1-5% with free market range<br>5-50% within existing supplier-buyer networks |
| **Issuer driven 'Opt-Out'** | 85-90% |
| **Recipient driven 'Opt-In'** | 1-5% for organisations without much purchasing power<br>50-70% for organisations in strong purchasing position |
| **Recipient driven 'Opt-Out'** | Up to 90% for organisations in strong purchasing position and providing electronic orders |

Many businesses do not operate in conditions that are conducive to adopting an Opt-Out approach. Nonetheless, the model should be customized to suit the feasibility within each specific context. Undoubtedly, some of your peers will eventually implement this strategy, which will have a tangible effect on your circumstances.

### 5.5 Overcoming Potential Barriers: Strategies for Success

The barriers differ greatly for enterprises in various countries and depending on the company size. Some known obstacles and possible measures to overcome those barriers:

| Known obstacles | Possible actions to overcome barriers |
|---|---|
| Legal requirements are unknown or confusing | The multi-stakeholder forums and/or federal administrations have the privilege of proactively disseminating relevant information to the broader market. Some of these entities organize informational events and roadshows or engage evangelists to further their reach. Additionally, many operate information portals that house key information for public access. |
| Missing market transparency about the solutions offered and the collaboration among various service providers | Multi-stakeholder forums and federal administrations are afforded the opportunity to proactively disseminate relevant information to the broader market. Several of these entities have established comprehensive information portals. Leading providers tailor their offerings with segment-specific information, enabling small businesses, for instance, to choose options like 'I am a small biller' or 'I am a small invoice recipient.' This facilitates an interactive dialogue that precisely delivers the pertinent information in a streamlined manner. |

| | |
|---|---|
| Change/adoption of internal organisation processes (40% of larger organisations) | It is inherent to human behaviour that established habits are resistant to change. This holds particularly true when a project impacts multiple departments, necessitating adaptations. Consequently, focused management oversight and decisive actions are essential. |
| Divergent requirements of trading partners regarding formats, methods and processes | In the context of bilateral (direct) exchange of structured electronic invoices, leveraging standards can alleviate the challenges involved. Additionally, operators of e-invoicing networks possess the capability to substantially decrease complexity for end-users. |
| Trading partner does not support the electronic invoice | From a statistical perspective, there is a considerable probability that your trading partner is already equipped to support electronic invoicing. This scenario may be attributed more to an information deficit rather than a lack of capability. Numerous federal administrations, multi-stakeholder forums, and provider associations have taken the initiative to maintain publicly accessible user directories.<br><br>In addition to enhancing transparency, trading partners frequently require motivation to adopt electronic invoicing promptly and guidance on its implementation. |
| Task sharing for accounting and invoice processing with external parties (trustee, tax consultant, commercial auditor, etc.); is in some countries practised by up to 50% of (smaller) enterprises. | These external parties exhibit apprehension or limited enthusiasm towards transitioning from labour-intensive (paper-based) processes to more efficient, electronic, and automated workflows. It may pose a significant challenge for multi-stakeholders to elucidate and demonstrate the risks associated with resisting the adoption of new electronic methodologies. |
| Lack of budget | Internal development initiatives often result in substantial initial and subsequent expenses. Conversely, applications and services that have been validated in the field from external providers tend to be considerably more cost-effective. Opting for on-demand services or Software as a Service (SaaS) models can lead to relatively moderate upfront investments. |
| Lack of understanding of current available solutions | Some market analysts enhance market transparency through their publications and events. Solution providers are urged to excel in market communications. |
| Lack of resources to manage automation | Elevate electronic invoicing to the enterprise's top priority. |
| Supplier resistance | Avoid enforcing a uniform approach and mandating a singular data format in alignment with your business process across all suppliers. Suppliers vary considerably in their capabilities and requirements. If those receiving invoices (or the electronic invoicing network operators involved) accommodate mul- |

| | |
|---|---|
| | tiple invoice formats, support any-to-any data conversion, and offer advantages (such as trade finance opportunities and early payment options), supplier acceptance is likely to markedly improve. |

### 5.6 Success Factors

In our globally innovative landscape, it's evident that the propensity for behavioural change among the majority hinges on external pressures. Consequently, merely extending an invitation to trade partners to adopt e-invoicing might not swiftly yield the anticipated success.

Given the unpredictable economic climate, which exacerbates cost pressures, it's likely that such conditions will serve as catalysts for modifications in invoice processing methods. It's advisable for organizations not to await coercion from customers or suppliers but to proactively embark on e-invoicing initiatives. This approach allows for the resolution of details without undue haste, facilitating a smooth transition from traditional paper invoicing to digital formats.

Historically, the immediate success of e-invoicing projects has been hampered by several factors:

+ Insufficient recognition of the project's impact across various processes and departments.
+ Inadequate project management.
+ An excessive focus on technical aspects rather than on critical challenges such as process automation and the integration of a significant number of suppliers or customers in a brief timeframe.

For e-invoicing initiatives to succeed, several critical factors must be considered:

+ Recognition by top management of e-invoicing's extensive potential, beyond mere savings on printing and postage or the manual entry of invoice data into ERP systems.
+ Support from management, given the cross-departmental nature of such projects.
+ Designation of a committed project lead.
+ Establishment of a three-year plan with phased implementation, starting with an initial phase that delivers immediate benefits (ideally, involving a single invoice stream within one division of a large organization).
+ Effective internal and external communication with all stakeholders involved.
+ Excellence in rollout strategy, aiming for a high adoption rate among suppliers/customers through preferable opt-out policies coupled with dynamic marketing efforts.
+ Realistic assessment of the organization's mid- to long-term technical capabilities in terms of workflow and archiving, making informed decisions on in-house development versus purchasing, and choosing between direct or networked solutions.
+ Avoidance of unnecessary development of solutions that are readily available at a fixed price and have been successfully tested in other organizations.
+ A practical understanding of the technical abilities of partners to send, receive, and archive electronic invoices, often significantly lower than anticipated. Simple, cost-effective interfaces and, if necessary, third-party archiving services are crucial.

### 5.7 Benefits and Business Case

For the past two decades, the momentum for the adoption of electronic invoicing has been predominantly driven by the private sector. Organizations have been transitioning to digital processes to leverage multiple benefits, including:

+ Enhancement of process innovation and automation
+ Increased operational efficiency and reduction in discrepancies and manual interventions

- Enhanced accuracy of master data and invoice content, ensuring alignment with orders and contracts
- Improved compliance with tax regulations
- Optimization of cash flow management
- Enhanced business flexibility
- Minimization of invoice fraud
- Enhanced transparency and accountability
- Environmental benefits
- Meeting digital interaction demands from key trade partners
- Cost reduction

The shift towards e-invoicing is, to a significant extent, an information technology (IT) initiative. This reality has compelled especially larger enterprises to conduct comprehensive business case analyses historically.

**These analyses have generally validated a fundamental principle: By adopting electronic and automated invoicing processes, businesses can achieve cost reductions of 60-80% compared to traditional paper-based systems, with a return on investment typically realized within 0.5 to 1.5 years.**

Contemporary surveys indicate that approximately 90% of major corporations in developed economies have adopted e-invoicing to some degree. Although in some cases the electronic exchange of invoices might represent a small fraction of their total invoicing, these companies likely still perceive a positive business case. Exceptions to satisfactory outcomes are relatively rare, with common issues including the continued operation of traditional paper-based systems alongside digital processes, attempts by companies to develop proprietary solutions rather than deploying proven third-party systems, and a reactive rather than strategic approach to e-invoicing implementation. These challenges often arise from the complex and varied IT, process, and compliance landscapes that develop over time.

It is projected that by 2030, up to 90% of organizations will be compelled to adopt e-invoicing, driven by legislative mandates or requirements from key business partners, making the necessity of a traditional business case less critical. Instead, the focus may shift towards evaluating the value proposition offered by various solution providers.

For those interested in a more detailed analysis of e-invoicing business cases, additional information is available at http://www.billentis.com/e-invoicing-businesscase.pdf.

### 5.8 Shifting Strategies: Moving from Reactive to Proactive

Certain government initiatives, such as the EU ViDA project, may experience delays in their implementation beyond the initially scheduled timelines. Nonetheless, this should not serve as a justification for postponing the acquisition of further details or specifications. Rather, it presents an opportunity to proactively prepare for various potential developments.

Employing a nimble internal solution or engaging with a versatile third-party service provider ensures sufficient adaptability to meet future requirements, irrespective of changes in legislation or the expectations of trade partners.

**Now is the time to take the next step!**

# 6. Service Providers in an Ambigious Market Environment

## 6.1 A Challenging Path to Reach the Promised Land

In light of the global implementation of e-invoicing mandates, this presents a significant opportunity for service providers. However, to capitalize on this opportunity, there is a necessity to increase current adoption rates from an average of 50% to up to 100% in countries where such mandates are in effect. This involves ensuring compliance with existing legislation, which often mandates the use of structured data formats for e-invoices, moving away from the predominantly used PDF formats. Consequently, we anticipate a substantial increase in e-invoice volumes, necessitating companies to establish new connections to ERP systems, transition to different data formats, and facilitate data exchanges with tax authority platforms.

Furthermore, service providers must undertake considerable investments in their current solutions to meet legal requirements, including integrating with emerging tax authority platforms and e-reporting mandates. This is particularly pertinent for providers aiming to operate across multiple jurisdictions, as they must navigate varying regulatory landscapes. Beyond legal compliance, service providers must also address technical challenges associated with adopting new technologies such as AI and managing significantly higher data volumes.

Another challenge is the growing competition within the e-invoicing market. Each new e-invoicing mandate sees approximately 50 new market entrants per country, a number that fluctuates with market size. This surge in providers is leading to a decrease in price levels, as newcomers often adopt low-price strategies, ultimately commoditizing e-invoicing services.

In summary, the initial phase may see a decrease in revenue and an increase in costs for service providers, before the benefits of higher volumes materialize.

## 6.2 Navigating the Tornado: The Urgent Crusade for Innovative Service Providers amid Regulatory Upheavals

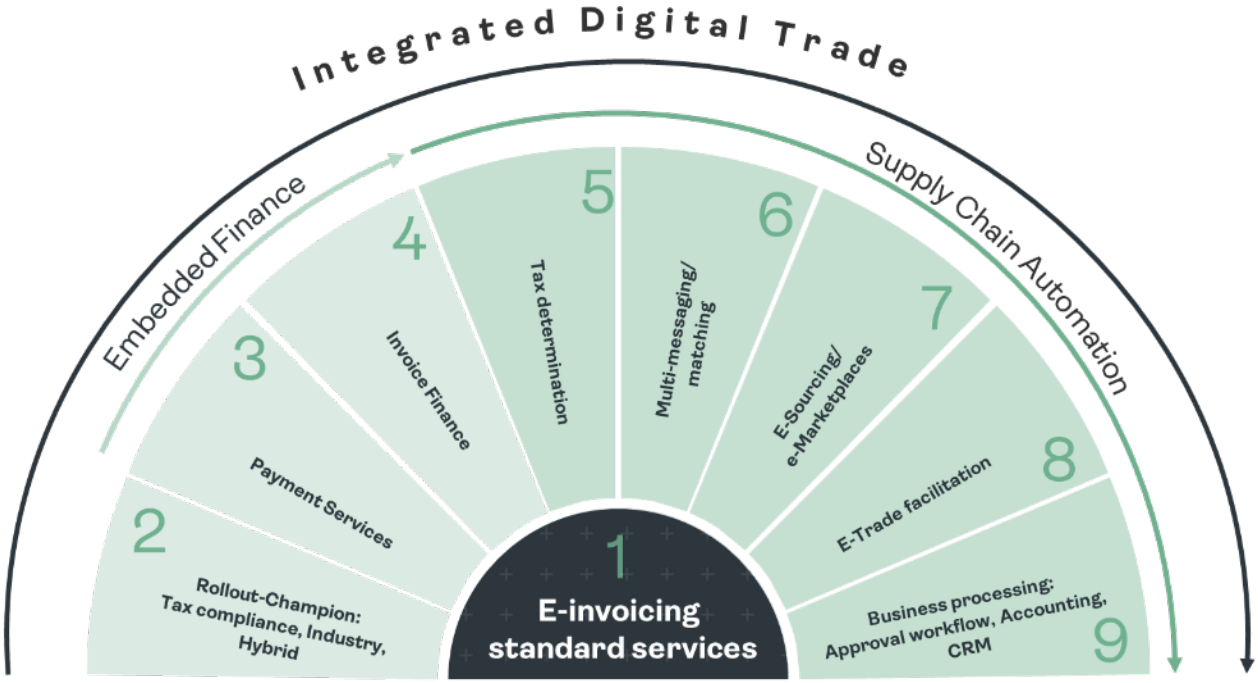
Even for larger enterprises, complying with swiftly evolving regulations via internal mechanisms often presents considerable challenges. As a result, it becomes crucial to engage third-party solutions and service providers to facilitate their navigation through these transitional periods.

Providers specializing in these solutions possess the requisite expertise and business acumen to manage such complexities. However, aiding clients through transitions remains a formidable task for them as well. The competitive landscape among these providers has intensified,

making customer-centric innovations and services more vital than ever. As standard electronic invoicing services gradually become ubiquitous, differentiating through unique offerings and innovations will be essential. Consequently, devising a sustainable and cost-effective strategy for future business management emerges as a critical concern for these service providers.

In addition to core electronic invoicing services, we identify several opportunities for the integration of value-added services. These services can be selected individually, combined in various configurations, or fully integrated, depending on the specific needs and preferences of the target customer segments and geographical regions. The decision to incorporate these services, either through partnerships or by developing them internally, will be guided by their strategic alignment with the business objectives and the requisite time to market.

Future markets radar for service providers – future management




1. The **e-invoicing standard service** offering may encompass a comprehensive range of capabilities, including data formatting across various formats, preparation of e-invoices that comply with domestic tax regulations, as well as their transportation/distribution and archival. Achieving cost leadership is essential for maintaining competitiveness in the future market landscape. Providers that are unable to elevate their processed invoice volume beyond the average market growth rate should consider mergers with competitors as a strategy to attain the necessary critical mass.
2. Service providers may strategically select specialized domains to excel as leaders in deployment and become **roll-out champion**. One potential approach is to comprehensively address global tax compliance needs, an offering particularly appealing to major multinational corporations. Given the distinct compliance requirements across various sectors, including retail, telecommunications, automotive, and others, some providers may opt to focus on these specific industries on an international level. Additionally, in the interim where paper invoices remain in circulation, providers can supplement their offerings with hybrid services such as scanning and printing, thereby ensuring complete coverage for all incoming and outgoing invoices for businesses.
3. The connection between payment processes and electronic invoicing is evident. With the introduction of new e-invoicing mandates that incorporate payment information, this link is becoming increasingly significant. Both traditional banking institutions and

numerous financial technology companies (Fintechs) are now providing a variety of new **payment services**. The emphasis is on enabling suppliers to present their customers with diverse payment alternatives. These services will be integrated into embedded finance solutions, which are designed to benefit both small and medium-sized enterprise (SME) suppliers but also large corporations across sectors such as telecommunications, utilities, and insurance, serving a substantial base of business-to-consumer (B2C) customers.

4. **Invoice Financing** represents another crucial component of embedded finance offerings. With the ascent of interest rates, the significance of this option is increasingly apparent. It provides suppliers with an accessible means to address immediate financial requirements through the financing of individual invoices. Overall, a variety of buyer-focused and supplier-focused solutions exist, enabling businesses to tackle the issue of delayed payments and enhance their working capital management.
5. In response to evolving tax compliance mandates, **solutions specific to tax** are increasingly integrating with e-invoicing systems. Tax authorities are tightening the requirements for the electronic submission of tax documents. While the initial focus was mainly on general ledgers and VAT declarations, there is now an expanding requirement for taxpayers to submit electronic versions of audit files, invoices, credit notes, debit notes, and payment receipt data produced by fiscal printers at points of sale. Moreover, businesses are pursuing assistance to accurately assess the correct VAT or Sales tax applicable to both inbound and outbound invoices.
6. Concentrating exclusively on the processing of electronic invoices is no longer adequate. Currently, over 50% of service providers also facilitate support for additional business communications or **multi-messaging**, such as orders, order confirmations, and statements. Initially, these documents are transmitted within an electronic envelope. Leading service providers go further by offering advanced services, including content validation and correlating information across various messages. The most sought-after services at present involve the alignment of orders, invoices, and delivery notes.
7. In the initial phase of supply chain automation, traditional **electronic sourcing** solutions and online marketplaces are progressively expanding into the domain of electronic invoicing networks, and conversely, these networks are also extending into the realms of e-sourcing and electronic marketplaces.
8. Exporters and importers handle numerous cross-border invoices, in addition to a significant volume of customs, trade, and **transportation documents**. These supplementary trade documents often contain information that significantly overlaps with that found in commercial and tax invoices. Tax authorities and auditors are intensifying their demands for documentation that verifies supplies and customs documentation. The initial electronic invoicing network operators are venturing into this domain to provide comprehensive electronic document services to their clientele, offering a full suite of services for exporters and importers.
9. To achieve full **business automation**, it is essential to also focus on solutions that identify the commencement or conclusion of the e-invoicing process. Commonly, this involves integrating Enterprise Resource Planning (ERP), Customer Relationship Management (CRM), billing, and accounting systems for dispatching invoices, as well as ERP, accounting, and approval workflow systems for invoice reception. Currently, service providers frequently address this need through strategic partnerships with these vendors. Conversely, these vendors are progressively incorporating e-invoicing solutions into their portfolios.

It is improbable that a significant number of solution providers will possess the capability to deliver such extensive functionality on a global scale within a feasible timeframe. Rather, it appears more likely that existing entities will use partnerships to consolidate services and applications from diverse sources, offering customers an integrated new service.

The architecture of future solutions may critically rely on existing and forthcoming legal mandates, in addition to facilitating real-time cooperation with tax authorities and among trade

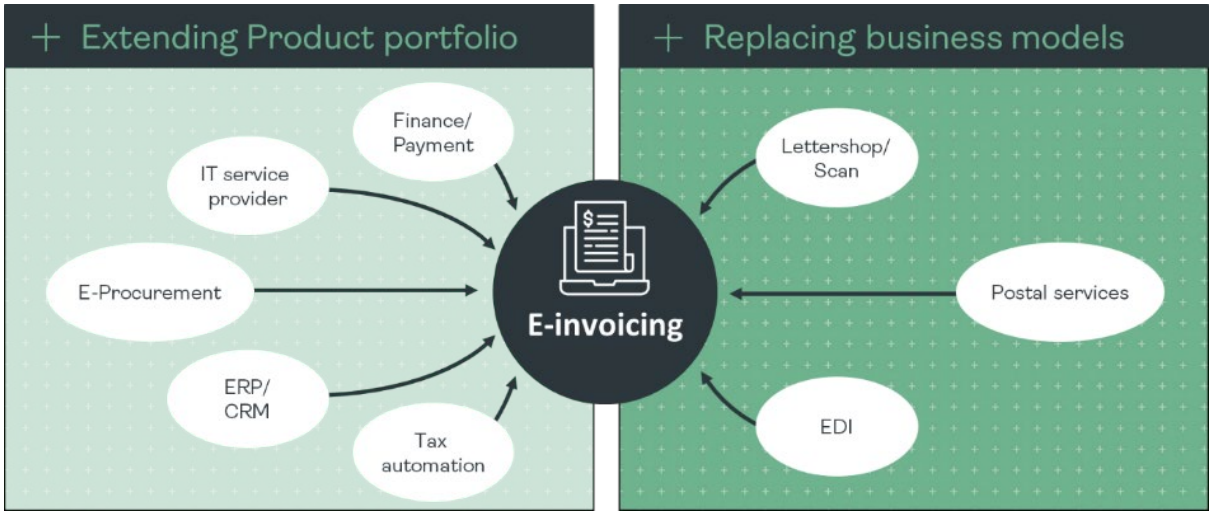
partners. The importance of platform openness, interoperability, and the endorsement of nascent technologies like AI and blockchain are key components.

Given the potential for e-invoicing services to become fully regulated over time, the competitive landscape for solution providers might intensify considerably. Distinguishing oneself from rivals offering basic e-invoicing services could prove challenging. Therefore, acquiring such a commodity service from third parties and concentrating on providing value-added services and features that meet consumer demands might be a prudent strategy.

### 6.3 The Expected Transformation of the Service Provider Landscape

As the market for electronic invoicing continues to grow, an increasing number of providers are entering the field. This expansion is anticipated to accelerate with each new e-invoicing mandate, estimating approximately 50 new providers for each obligation. Particularly in Europe, the implementation of VAT in the Digital Age (ViDA) is expected to see around 1,000 active providers in the e-invoicing space.

The influx of new providers primarily stems from industries whose business models are being replaced by e-invoicing and from adjacent sectors with a direct link to e-invoicing activities.

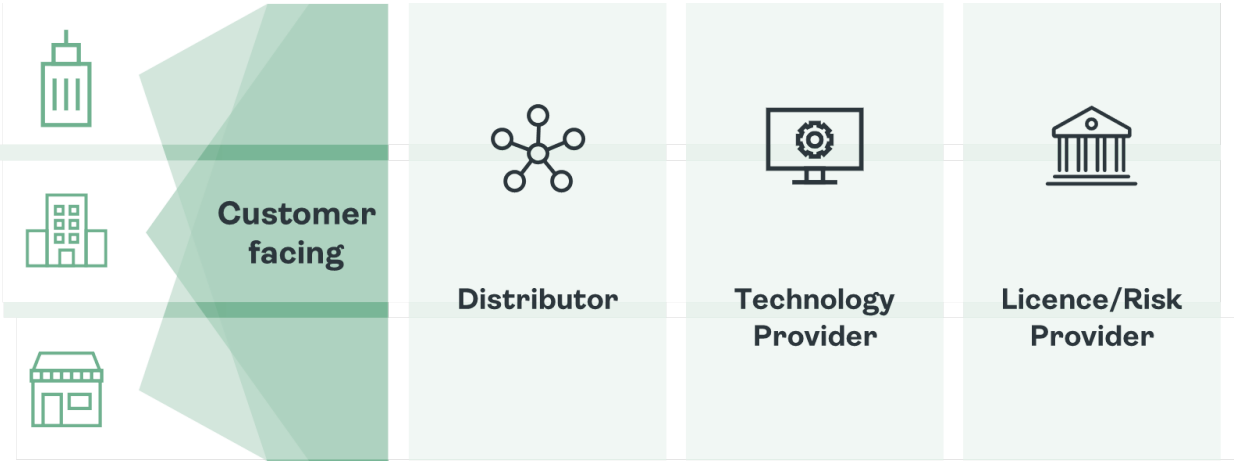



Notably, traditional postal services, lettershops, and scanning services are examples of sectors partially supplanted by e-invoicing. The shift towards mandatory electronic invoicing poses a significant challenge for these providers, potentially eroding a substantial portion of their current business. Consequently, there is heightened pressure within these sectors to engage in e-invoicing as a means to offset losses and adapt to the evolving landscape.

For traditional Electronic Data Interchange (EDI) providers, the transition may only partly apply, as they are likely to meet future e-reporting and e-invoicing requirements with minimal technical adjustments, primarily concerning data formats. However, they too must increasingly adopt four-corner models to remain competitive and relevant in the changing market.

Given that invoices are central to business processes between buyers and sellers, numerous sectors utilize or process invoice data, including payment and financing, procurement, tax automation, and Enterprise Resource Planning (ERP) system providers. For all these sectors, e-invoicing opens up new opportunities to enhance their existing services. Whether through streamlined processes, improved accuracy, or enhanced data analytics, the shift towards electronic invoicing not only signifies a change in how businesses manage transactions but also offers the potential for significant efficiency gains and innovation in business operations.

In parallel with the increasing number of providers, the market is simultaneously undergoing consolidation. In the short term, growth will outpace consolidation. Therefore, it becomes crucial for providers to strategically position themselves within the market. This includes understanding the distinct roles providers play. The roles of Distributor, Technology Provider, and License/Risk Provider are identified as key.




The Distributor collaborates with Technology Providers and, where applicable, License/Risk Providers to create a seamless user experience for customers. This combined offering is integrated into the existing functionality of the Distributor, who then facilitates access to the customer. Companies already serving large customer bases are primarily suited for this role.

Technology Providers configure and maintain the technology, typically made available to Distributors via API. This can involve individual components of the Integrated Digital Trade spectrum or already combined solutions. Specialists in areas such as Payment, e-Procurement, or e-invoicing, who lack access to larger customer groups or are hesitant to make such investments, find their place in this role.

Lastly, the License/Risk Provider, operating in regulated areas like Payment or Financing, provides the necessary licenses. This category also includes certified service providers specializing in licensed access to tax compliance platforms, offering their services to other providers.

At least in the short to medium term, these roles will be distinguished by different customer segments such as small, medium-sized, and large enterprises, necessitating tailored combinations of offerings depending on the segment.

**Ultimately, it is imperative for service providers to be aware of their desired market positioning and initiate the necessary steps to align with market requirements in a timely manner.**

### 6.4 Consolidation Ahead: Navigating the Evolving Landscape of E-invoicing and the Emerging Opportunities for Service Providers

As outlined, service providers in the e-invoicing sector are poised to encounter a range of challenges as the market evolves, including the commoditization of e-invoicing services and the necessity for substantial capital investments. Concurrently, a significant surge in the volume of transactions, including invoices and related documents, is anticipated.

Furthermore, the proportion of transactions processed through service providers, as opposed to direct buyer or supplier models, is expected to witness a marked increase. This shift

is primarily attributed to the escalating complexity of tax compliance regulations across various jurisdictions, coupled with a dynamic marketplace characterized by rapidly changing requirements.

However, the primary driver for this transition is the growing adoption of four and five-corner models globally, significantly influenced in Europe by the ViDA initiative, which promotes these models across all EU member states. Even countries traditionally dominated by two-corner models, such as Germany and Austria, are transitioning towards a model that emphasizes the use of service providers. In Asia, the adoption of Peppol standards by tax authorities is fostering a similar shift, as Peppol inherently supports four and five-corner models. Similarly, the North American market is beginning to embrace these models, driven by initiatives from DBNA and collaborations with associations like OpenPeppol and GENA.

A defining feature of the four and five-corner models is their reliance on service provider networks, facilitating document exchange among all network participants. This characteristic positions the e-invoicing market as highly advantageous for early adopters, as a more extensive network user base significantly enhances the network's value for new participants, who are likely to find a majority of their business partners already on the network.

**Given the anticipated increase in transaction volumes, coupled with the need for higher investments and the benefits of being an early adopter, a significant consolidation of the e-invoicing service provider market is expected in the near term.**

From the current count of approximately 5,000 e-invoicing service providers worldwide, this number is projected to decline substantially over time. It is imperative for service providers to act swiftly to achieve a critical mass within their target market segments to remain competitive.

## 7. OpenPeppol

Read on to discover more about how Peppol enables globally interoperable eInvoicing and consumption tax reporting to meet the needs of businesses and governments.

# Discovering Peppol

## eInvoicing – what problem are we trying to solve?

Trade is the key driver of economic growth at both domestic and global levels, and business success is critical for economic growth.

Every trade transaction results in a financial exchange between the buyer and seller. In the Business-to-Consumer world (B2C), payment is almost instantaneous, utilising either cash or the highly developed payment card system. But in the Business-to-Business (B2B) and Business-to-Government (B2G) sectors, almost every transaction results in an invoice, with payment following, often weeks or months, later.

These slow payment cycles can negatively impact business. Faster invoice processing improves cashflow and reduces business operating costs, improving efficiency and competitiveness.

- *eInvoicing helps to improve business efficiency*

At a national level, the collection of consumption tax (VAT, GST etc) typically equates to around 30% of government income. Nevertheless, most countries experience a shortfall in their expected consumption tax income. As an example, in the European Union, this tax gap equated to €93bn in 2020, equivalent to 9.1% of the expected income.

Collecting the expected amount of consumption tax helps governments to reduce borrowing and/or increase public spending, thereby improving economic performance and competitiveness on the international stage.

- *eInvoicing helps to reduce the tax gap*

At Peppol, we believe that the global opportunity from eInvoicing equates:

- to around 1% of GDP from improved business efficiency
- to around 1% of GDP from increased consumption tax revenues

As businesses search for greater efficiencies and governments search for greater income, eInvoicing provides a proven path to achieve both.

You may rightly ask why these benefits have not already been universally realised. Read on to find out why and to discover how Peppol provides a solution to resolve these conceptually simple problems.

## About eInvoicing

eInvoicing needs to be considered in two parts:

- the eInvoice itself
- the mechanism for sending and receiving an eInvoice

An eInvoice can be defined as an invoice that is created in a structured digital data format, designed for machine-to-machine processing without the need for manual intervention. To achieve its function, the data contained in an eInvoice does not need to be human readable.

It is important to recognise that an eInvoice is not a PDF, a digital image, or a digital document created in a spreadsheet. While these formats are human readable, they cannot be processed without manual intervention.

eInvoices are created in the IT systems of the seller and received into IT systems of the buyer. However, since sellers and buyers typically use different commercial off-the-shelf or customised IT systems, the ability of the buyer to automatically receive an eInvoice is constrained, unless:

- the invoice meets a standardised data model

The Peppol Business Interoperability Specifications (BIS) utilise the Universal Business Language (UBL), which is an ISO open standard.

However, while a standardised data model facilitates the creation of an eInvoice, it still has to be transmitted from the seller to the buyer.

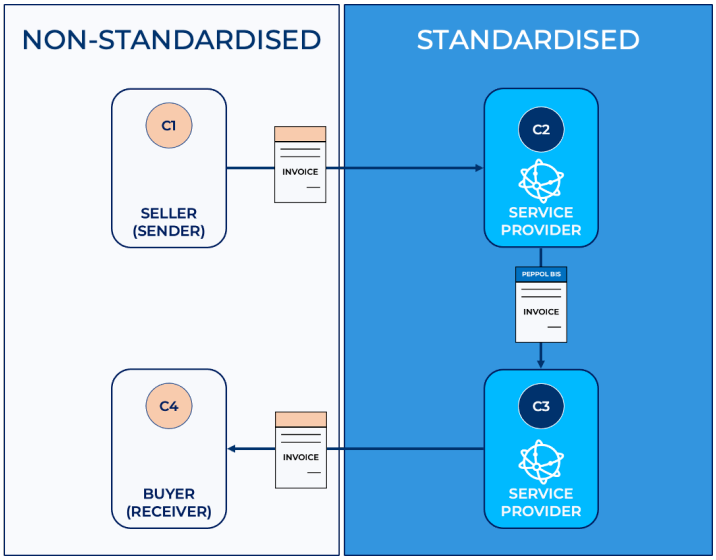
Historically, a method of data exchange was established by attaching a file to an email, or by a point-to-point connection between each seller and buyer (a *two-corner* model). This evolved with third party EDI providers exchanging eInvoices between buyers and sellers in a *three-corner* model, utilising data models individually tailored for each client.

Whilst these two and three corner data exchange methods remain in widespread use, they either do not provide automation, or they require the seller and buyer to use the same system or service provider.

In recent years, Peppol has led the way in establishing a *four-corner* model, where eInvoices can be created in one system and received in another, through a network of connected service providers, where the senders and receivers choose their service provider independently of each other.

## The four-corner model

As a business, you want to reach your customers and suppliers by using your existing systems. Having to run multiple systems and processes required by different trading partners is expensive and inefficient. The four-corner model overcomes this problem as shown in the diagram.




In the case of an eInvoice, the seller is shown at Corner 1 (C1) and the buyer is shown at Corner 4 (C4).

The service provider at Corner 2 (C2) is appointed by C1 to send eInvoices (and any other electronic business document) on his behalf and, similarly, the service provider at Corner 3 (C3) is appointed by C4 to receive eInvoices on his behalf.

On receiving an eInvoice from C1, C2 creates a standardised Peppol eInvoice for transmission to C3. Before sending the standardised eInvoice, C2 uses validation tools to ensure that the eInvoice is compliant with the standardised data model and can be received by C3.

The Peppol eInvoice is received by C3 who converts it to a format required by C4, enabling the eInvoice to be consumed by the systems used by C4.

Note that both C1 and C4 operate in a non-standardised environment, which means that they can retain their existing systems and processes.

However, as many software vendors supply systems that natively produce and consume Peppol eInvoices, their customers at C1 and C4 are already able to send and receive Peppol eInvoices through C2 and C3, without the need for transformation, thereby achieving straight-through processing.

Of course, sellers are also buyers, and each use their respective service provider to both send eInvoices (as C1) and receive eInvoices (as C4).

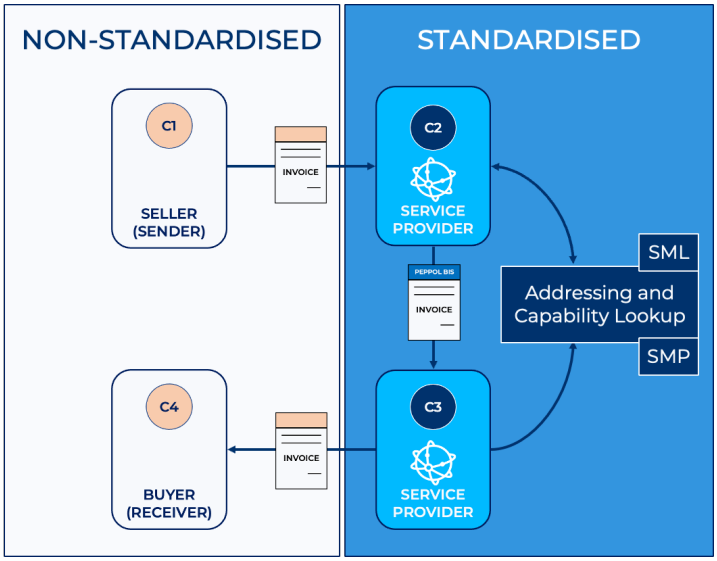
- only one point of connection is needed to reach the whole network

## Discovery

Each service provider acts as an access point to the Peppol Network, providing the connections in the four-corner model to ensure that each business only needs one service provider to send and receive eInvoices.

However, in the same way that email connections and telephone networks need to know how to route the message or call to the intended receiver, so the access point at C2 in the four-corner model needs to discover where to send the eInvoice. This requires an addressing service.

Before sending the eInvoice, C2 also needs to discover whether the intended receiver at C4 is capable of receiving the eInvoice, requiring a capability lookup service.




In Peppol, these addressing and capability lookup services are provided through the Service Metadata Locator (SML) and the Service Metadata Publisher (SMP), as shown in the diagram.

The SMP is a decentralised registry operated by Peppol service providers. Most, but not all, Peppol access point providers also offer SMP services, while a minority of Peppol service providers offer SMP services only. The SML is a central component in the Peppol Network, and is operated by the European Commission.

To enable the addressing and capability lookup service to function, each SMP is initially registered in the SML by the Peppol SMP service provider. Each C3 access point then uses an SMP to register their C4 customers (participants) in the SML. The C3 access point then registers their C4 participant receiving capabilities in an SMP, listing the Peppol specifications that the participant can receive, such as a Peppol eInvoice.

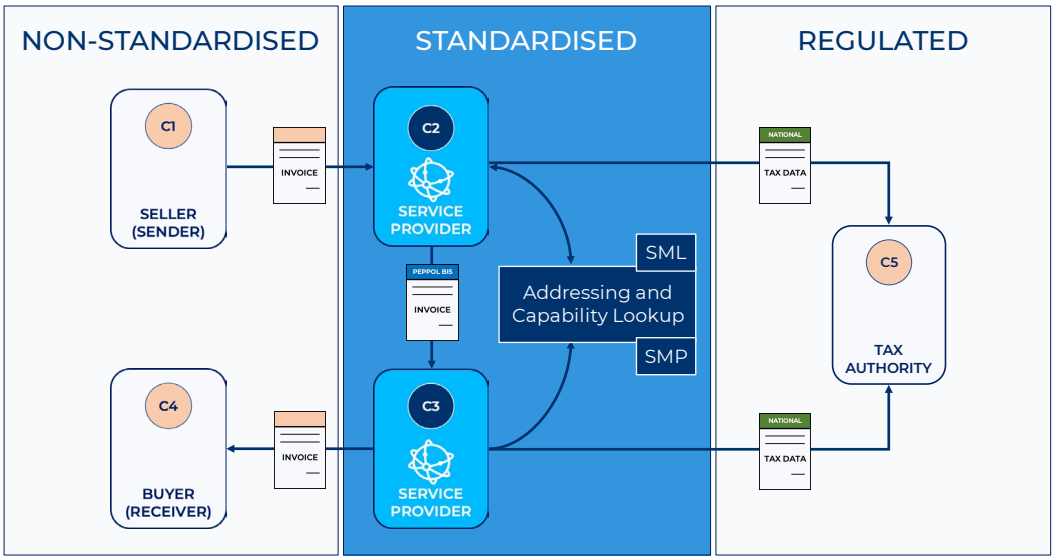
At the transactional level, in near-real time, C2 accesses the SML to locate the C3 service provider acting for C4, and then accesses the SMP to discover the receiving capabilities of C4, before sending the eInvoice.

## Extending the four-corner model

eInvoicing is increasingly being leveraged by tax administrations to improve business efficiency and increase consumption tax collection, through the introduction of Digital Reporting Requirements (DRR), also known as Continuous Transaction Controls (CTC).

Tax administrations require data at a transactional level from businesses to enable consumption tax to be reported in near-real time, enabling faster collection and facilitating a reduction in the tax gap.

The Peppol four-corner model provides a solid foundation for governments to implement DRR/CTC requirements. By adding a fifth corner to the model, as shown in the diagram, the eInvoicing model can simply be extended to meet the reporting requirements of tax administrations at the same time as meeting the needs of businesses.



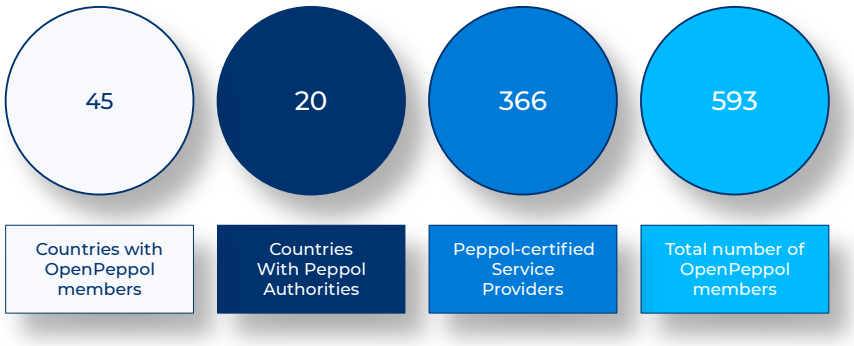

Since the required data already exists in each individual invoice, tax administrations can leverage eInvoicing to capture the data required for DRR/CTC. Businesses benefit by re-using a single mechanism to meet their eInvoicing requirements and meet the needs of tax administrations.

As well as DRR/CTC, governments are beginning to require digital reporting from businesses for other policy initiatives, such as Environmental, Social, and Governance (ESG) reporting. By adopting the five-corner model, businesses and governments can realise their eInvoicing and eReporting obligations through the Peppol Network.

## OpenPeppol participation

The Peppol approach to creating and exchanging eInvoices is increasingly being adopted around the world. OpenPeppol is the international membership association that implements Peppol, and any organisation can apply for membership, subject to due diligence processes, in one of four categories of membership:

- Peppol Authorities – government agencies that drive the adoption of Peppol in their jurisdiction
- End Users – commercial and governmental organisations that are trading partners buying and selling goods and services
- Service Providers – commercial organisations that provide Peppol services to sellers and buyers, although some End Users may operate their own Access Point to connect to the Peppol Network
- Observers – typically industry organisations, academic institutions, consulting firms, and prospective members of other categories




While end users are not required to be members of OpenPeppol to send and receive Peppol messages, approaching one million end users are registered to receive Peppol messages. Since senders of Peppol messages do not need to be registered in the network, the total number of organisations connected to the Peppol Network exceeds one million.

Although OpenPeppol has public and private sector members in 45 countries, Peppol messages can be sent and received by any organisation in any country, provided they are registered in the network.

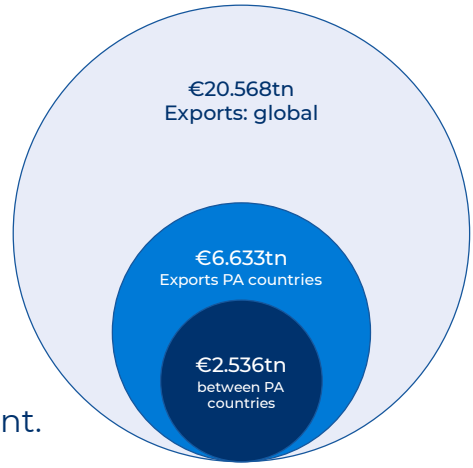
The number of registered receivers and service providers rises every week, while typically two new Peppol Authorities are established every year.

## Driving global interoperability

Exporting businesses need real-time automation with their customers to maximise efficiency and to manage cash-flow, while tax administrations need real-time automation to maximise consumption and customs tax collection. The scale of cross-border trade is significant, with global exports equating to 22% of global GDP in 2021.

Exports from countries with a Peppol Authority equates to 32% of global exports, and exports between countries with a Peppol Authority equates to 39% of their combined exports.

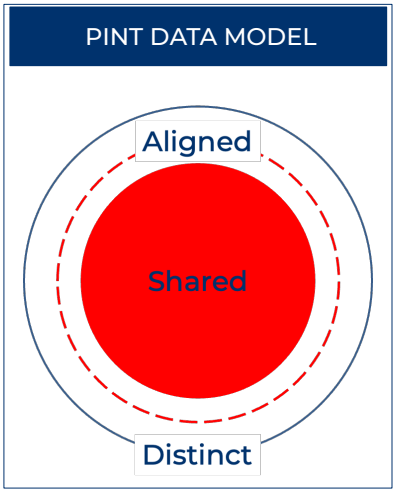
As Peppol becomes increasingly adopted around the world, the need for interoperability to support these requirements arising from cross-border trade becomes ever more important.




Export values 2021 (source. World Bank)

To meet this need for global interoperability, where business can seamlessly exchange eInvoices across borders, Peppol has developed the Peppol International Invoice, also known as PINT. This is a development of the Peppol BIS eInvoice specifications, with three key features that, taken together, facilitate cross-border interoperability.

Peppol has shown that there is a core dataset common to all invoice transactions. In the PINT data model, this is the shared element, which is business-driven, with content around trading parties, items, prices and amounts. The shared element covers around 80% of invoice content.




The aligned element is legally driven, with the content around tax information that varies across jurisdictions, but can be aligned. This typically covers around 15% of invoice content.

The distinct element covers around 5% of invoice content, typically in relation to organisational identifiers that are jurisdiction-specific.

Each jurisdiction will have its own PINT specification supporting both domestic and cross-border exchange. PINT is implemented in several Asia Pacific countries and will be extended to all jurisdictions over time.

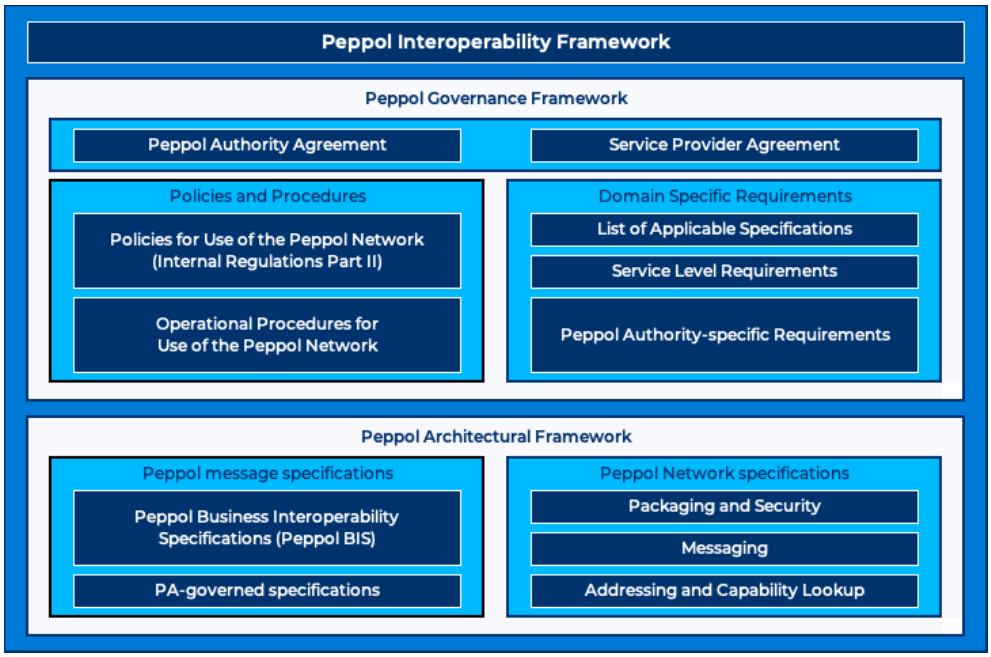
## Peppol Interoperability Framework

In isolation, the Peppol Business Interoperability Specifications and the Peppol Network are not sufficient to create an open, interoperable, and secure global network for the exchange of electronic business documents.

For sellers and buyers to successfully exchange business documents across the Peppol Network, a set of rules and specifications are required to ensure that all organisations involved in the Peppol Network act together to provide a trusted environment.

These rules are established through the Peppol Interoperability Framework, which provides a set of agreements, policies, procedures, and technical specifications that collectively ensure interoperability.

The Peppol Interoperability Framework is governed by OpenPeppol and regulates use of the Peppol Network through the Peppol Architecture Framework and the Peppol Governance Framework.




Peppol provides a consistent approach to core specifications that apply across all jurisdictions. However, there is flexibility, within defined parameters and approval processes, for Peppol Authorities to introduce national service domains and complementary message specifications.

In this way, new specifications and service areas can be incubated in a controlled environment before being made available across the Network.

## Governance Framework

OpenPeppol was established in 2012 as a follow-up to the EU-funded 2008 eProcurement/eInvoicing large-scale pilot. As a not-for-profit, member-led international association, OpenPeppol is the legal organisation that establishes the governance arrangements for the use of Peppol.

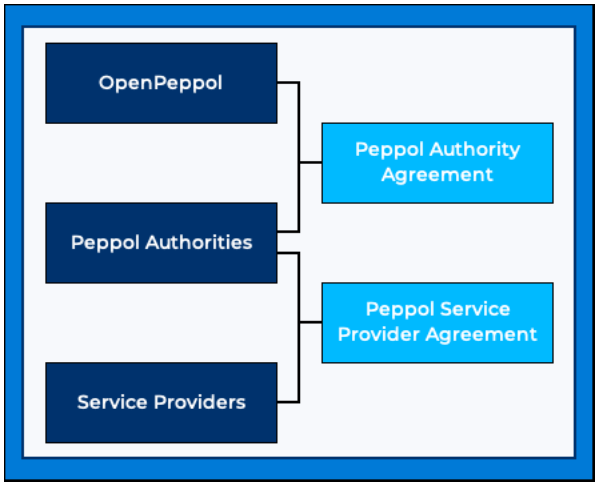
The stakeholders in Peppol are the:

- sellers and buyers and that send and receive eInvoices
- service providers that provide Peppol services to sellers and buyers
- Peppol Authorities that drive Peppol adoption in their jurisdiction

OpenPeppol has established standardised legal agreements that set out the roles and responsibilities of Peppol Authorities and Peppol Service Providers, providing an open and transparent community, and ensuring that the technical specifications and business-level rules are consistently applied throughout the network.

The Peppol Authority Agreement is established between OpenPeppol and each Peppol Authority. Within defined parameters, Peppol Authorities are able to define Peppol Authority Specific Requirements (PASR) for use of the Peppol Network in their jurisdiction.

The Peppol Service Provider Agreement is established between each Peppol Authority and the Peppol Service Providers that are domiciled in their jurisdiction. If a service provider is domiciled in a jurisdiction without a Peppol Authority, the Service Provider Agreement is established between OpenPeppol, as the Peppol Authority, and the service provider.




The Governance Framework includes comprehensive Policies and Procedures for Use of the Peppol Network, and sets out the specifications and requirements applicable to individual service domains and jurisdictions.

## Architectural Framework

Peppol-certified Service Providers provide Peppol business document exchange services to sellers and buyers. OpenPeppol has established a set of technical specifications for Peppol business documents, together with processes and specifications for the Peppol Network.

These specifications enable Peppol-certified Service Providers to deliver the necessary semantic and technical interoperability and include:

- Peppol Business Interoperability Specifications (BIS)
- Peppol Authority governed specifications
- Packaging and Security specifications, utilising the AS4 protocol
- Messaging specifications
- Addressing and Capability Lookup specifications

The Peppol BIS standardises electronic documents for validation and secure exchange between Peppol-certified Service Providers through the Peppol Network, supporting sellers and buyers around the world.

A set of tools and guidance is provided for service providers to implement the Peppol specifications and to implement the following components:

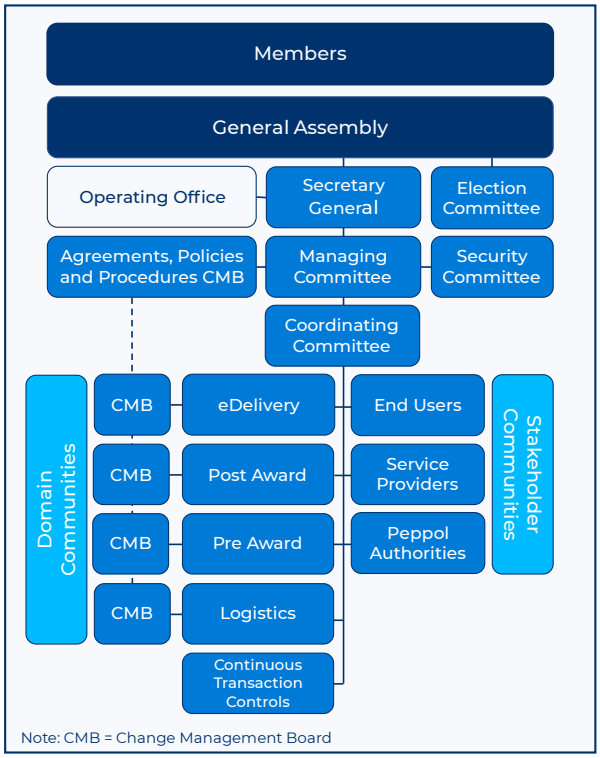
- Access Points, which are gateways that provide a standardised and secure mechanism to exchange a range of document types
- Service Metadata Publishers (SMPs), who provide the location and capabilities of sellers and buyers registered in the Peppol Network
- the Service Metadata Locator (SML), which maintains participant IDs and provides a DNS-based mechanism to discover the SMP where the data and receiving capabilities of a specific participant can be found

The Peppol Directory is a free-to-browse, open source service that makes it easy for sellers and buyers to find each other in the Peppol Network and identify the Peppol document types that can be received by each other.

In combination with the governance processes, security is achieved through the use of a Public Key Infrastructure using digital certificates; the use of AS4 as the transport protocol; and the use of an ‘envelope’ (SBDH) to ‘wrap’ the transaction data allowing routing without access to the data.

## OpenPeppol organisation

The organisation of OpenPeppol is shown in the diagram. All members of the Association form the General Assembly which meets at least once every year to review performance for the prior year; to approve plans and budgets for the coming year; and to elect volunteers from the membership to different positions in the organisation.




The Election Committee decides on the eligibility of candidates that are proposed for elected positions.

The Secretary General has day-to-day responsibility for oversight and management of the Association.

The Domain Communities cover the different service domains established in OpenPeppol, and lead the development of Peppol specifications and related technical development activities. Change Management Boards decide on updates and amendments to policies, procedures, and specifications for their area of interest.

Stakeholder Communities represent the interests of their member types.

The leaders of each of the Domain and Stakeholder communities form the Coordinating Committee, ensuring alignment on cross-cutting activities.

The Agreements, Policies and Procedures CMB is responsible for development of the governance aspects of OpenPeppol.

The Security Committee is responsible for development of the Peppol Security Policy and driving the importance of a strong security culture.

The Managing Committee provides oversight of all activities undertaken by the Association, and comprises the Secretary General and two members from each of the Stakeholder Communities.

The Operating Office supports the day-to-day activities of the Association.

## Join the Peppol journey

Peppol improves business efficiency between organisations by standardising the way electronic information is structured and exchanged.

Whilst eInvoicing is the key driver of Peppol adoption around the world, Peppol also offers an ever expanding range of business document specifications, most recently with the addition of logistics message types.

**The Peppol framework** enables interoperability and efficiency **B2G and B2B**

**Peppol CTC** is a flexible approach, meeting the varying needs of tax administrations

The **Peppol International Invoice** enables cross-border and cross-continental interoperability

**Peppol**
Connect once – reach all

The Peppol Network was conceived so that individual business do not need to be members of OpenPeppol to send and receive eInvoices and other business documents, with Peppol business document exchange services being provided by Peppol-certified Service Providers.

If you are business and want to utilise Peppol, you can find a listing of all Peppol-certified Service Providers on the Peppol website here:

https://peppol.org/members/peppol-certified-service-providers/

If you are a government agency and want to find out more about Peppol and how we can help meet your needs, please email us directly.

If you are a service provider or business software developer and want to become Peppol certified, comprehensive technical and joining information can be found on the Peppol website.

### More information

Website: www.peppol.org

eMail: info@peppol.eu

# 8. Appendix

## 8.1 Glossary

Throughout this report, several critical concepts are consistently mentioned. To ensure clarity and avoid any confusion, the definitions provided herein apply to these concepts.

| | |
|---|---|
| **AR** | Accounts Receivable are monies owed to a supplier by its customers arising in the normal course of business from the delivery of goods and services. They are usually represented by outstanding invoices. |
| **AP** | Accounts Payable are monies owed by a customer to its suppliers arising in the normal course of business from the delivery of goods and services. They are usually represented by outstanding invoices. |
| **Artificial Intelligence, AI** | Broader concept of machines being able to carry out tasks associated with humans around learning and problem solving. It has the cognitive ability to look for and learn on certain patterns and to take appropriate actions. |
| **B2B Invoices** | In this report includes all tax compliant invoices to corporate as well as to the public sector; B2B & B2G/G2B |
| **Bill** | Includes all categories of bills sent to consumers (B2C/G2C) |
| **Continuous Transaction Controls (CTC) models** | Under this framework, organizations are mandated to report invoices to tax authorities or, at the least, furnish key invoice details electronically. The concept includes different models such as Real-time Reporting, Clearance, Centralised Exchange and Decentralised CTC and Exchange. |
| **DPO** | An efficiency ratio that measures the average number of days a company takes to pay its suppliers. |
| **DSO** | The days sales outstanding is a calculation used by a company to estimate their average collection period. |
| **E-billing** | E-billing covers in this report the electronic bills from Business-to-Consumers (B2C). Some market participants use this term alternatively for the process on issuer side in general, regardless if the customer is an enterprise or household. |
| **EBPP** | Electronic Bill Presentment and Payment; focus in B2C; this acronym is more popular outside Europe |
| **EIPP** | Electronic Invoice Presentment and Payment; focus in B2B/B2G; this acronym is more popular outside Europe |
| **E-invoicing** | Electronic invoicing is the sending, receipt and storage of invoices in electronic format without the use of paper-based invoices as tax originals. Scanning incoming paper invoices or exchanging electronic invoice messages in parallel to paper-based originals is not electronic invoicing. |
| **Integrated Digital Trade (IDT)** | Integrated Digital Trade, transcending previous definitions such as Financial Supply Chain, EDI, Order-to-Cash, Procure-to-Pay, and Business Automation. This segment represents a holistic approach to digitally facilitated trade, including financial, procurement and e-reporting processes. |
| **Internet of Things, IoT** | Infrastructure of the information society. The inter-networking of physical devices, vehicles (also referred to as 'connected devices' and 'smart devices'), buildings, and other items - embedded with electronics, software, sensors, actuators, and network connectivity that enable these objects to collect and exchange data. |
| **Invoice** | Includes in this report all categories of invoices: B2B, B2C, B2G, G2B |
| **Issuer** | Invoice issuer, supplier, biller |

| | |
|---|---|
| **Network operator** | Service provider respectively operator with any-to-any model; an invoice issuer or recipient needs just one interface for achieving any other counterparty in the same network; In some countries, the terms 'operator', 'service provider', 'consolidator' or 'supplier network' are more common. |
| **Order-to-Cash** | Is the business process for receiving and processing customer sales. It follows the sales opportunity, order, delivery, invoice and payment, and covers both business-to-business (B2B) and business-to-consumer (B2C) transactions. |
| **P2P** | Is the process and supporting systems that automate the purchase-to-payment chain of activities, connecting procurement and invoicing operations through an intertwined business flow that automates the process from identification of a need, planning and budgeting, through to procurement and payment. |
| **PO** | Purchase Order |
| **POS and mobile invoicing** | Point of Sale invoicing; on a classical payment receipt, the included information is limited and the customer is normally not identified; if however, the customer is identified and considered in the content of the resulting confirmation document, the former payment receipt is upgraded to a classical invoice that can automatically be processed. The same is valid for purchases via mobile devices, e.g. train and flight tickets. |
| **Procure-to-Pay** | Buyer perspective for the processes of selecting vendors, establishing payment terms, strategic vetting, selection, the negotiation of contracts, actual purchasing of goods, order, delivery, invoicing and payment. |
| **Purchase-to-Pay** | Buyer perspective for the processes order, delivery, invoicing and payment. Purchasing is a subset of procurement. |
| **SCF** | Supply Chain Finance is defined as the use of financing and risk mitigation practices and techniques to optimize the management of the working capital and liquidity invested in supply chain processes and transactions. SCF is typically applied to open account trade and is triggered by supply chain events. Visibility of underlying trade flows by the finance provider(s) is a necessary component of such financing arrangements, which can be enabled by a technology platform. |
| **SME** | Small and Medium sized Enterprise |
| **Recipient** | Buyer, Customer; The individual or organization that will receive the invoice |

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