



Digital trade is the way forward for New Zealand

**A preliminary assessment of the costs and benefits of
digital trade**

December 2021

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Authorship

This paper was prepared at NZIER by Chris Nixon.

It was quality approved by Mike Hensen and John Yeabsley

The assistance of Sarah Spring is gratefully acknowledged.

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Registered office: Level 13, Public Trust Tower, 22–28 Willeston St | PO Box 3479, Wellington 6140
Auckland office: Ground Floor, 70 Shortland St, Auckland
Tel 0800 220 090 or +64 4 472 1880 | econ@nzier.org.nz | www.nzier.org.nz

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Key points

This report provides a preliminary estimate of the costs and benefits of deploying digital trade products and processes for New Zealand.

Digital trade encompasses the supply of cross-border goods and services enabled by electronic data flows based on a myriad of interoperable platforms and applications.

TradeWindow is a provider of these products. While they and their direct customers will be major beneficiaries of digital trade, the benefits will spill over to all participants in the supply chain, including government, logistics companies, customers, banks, and other supply chain participants.

Main findings

Digital trade products such as those provided by TradeWindow have the potential to fundamentally change the supply chain for specific products by providing automated services that make it much easier and faster to trade legitimate products. These automated services offer multiple benefits:

- **Productivity gains.** These include 'one off' productivity gains from moving away from paper-based systems, ongoing benefits as resources shift from skilled labour-intensive paper systems to more productive activities, and improved ability to innovate.
- **Connectivity gains.** Increased ability to trade as barriers to trade are broken down allowing more trade in old products in old markets, old products in new markets, and new products in new markets.
- **Predictive gains.** Digital trade generates a large amount of new product-specific data at low cost. This data can be used to predict product-specific demand and fluctuation in demand, greatly increasing the ability of suppliers to anticipate demand.
- **Visibility and transparency gains.** All permissioned parties within the value chain can access one set of documents (the source). This avoids confusion on what trade terms parties agreed upon and clarifies the obligations of each of the parties.
- **Inclusiveness gains.** By making it easier to trade, trade barriers are reduced especially for MSMEs (micro-, small and medium-sized enterprises) and SMEs (small and medium-sized enterprises). This allows more SMEs and MSMEs to be involved in trade and share in the potential benefits relative to trading exclusively on the domestic market. It may also improve perceptions of trade more generally.

The analysis considers that the benefits will accrue over a number of years and that the benefits will 'ramp-up' in later years as adoption of the system increases.

Costs cover implementation costs (hardware, software and training) and outreach to MSMEs and SMEs to support their introduction into digital trade.

Table 1 summarises the estimated impacts of rolling out digital trade to selected countries and regions. We have ‘picked on’ the countries/regions which we think will be most receptive to digital electronic processes and practices, i.e.:

- Taiwan – a digital trade pilot took place last year using TradeWindow and TradeVan platforms (TradeWindow and TradeVan are both members of the Consortium of 14 Trade and Customs Service Providers).
- Singapore – legislation has already been enacted to facilitate digital trade. This will make the transition easier for New Zealand.
- Countries involved in or soon to be involved in the Digital Economy Partnership Agreement (DEPA), which provides the international architecture for digital trade to flourish. The DEPA consists of Singapore, New Zealand and Chile. The “+2” countries are looking to join the DEPA (South Korea and Canada). Very recently, China has also asked to join the DEPA (+1). If China is admitted, this will have a significant beneficial impact and, importantly, encourage others to join the DEPA.

We have also set out the annual average impact on APEC if digital trade were to be introduced over ten years and the present value of the benefits. Optimisation of the returns from this innovation happens when our long term objective is to use digital trade in fast-growing economies where our products are in demand. We have also illustrated the impact of such trade with the United States, China, and the United Kingdom in Appendix B.

The potential benefits from digital trade for supply chain partners are very large. These come from re-organisations of back offices, better utilisation of skilled staff, an increased focus on innovation, and increased trade brought on by increased connectivity, to name a few. We estimate that the benefits for all of APEC would be between \$9 billion and \$18 billion over ten years. To put this into context, New Zealand’s annual export trade is approximately \$61.5 billion.

Benefits of this size suggest that pursuing digital trading initiatives should be made a priority. As an unambiguous reduction in transaction costs, they are akin to a tariff drop, with the added benefit of speeding up the processes lying behind trade. They could be just as significant as operationalising a major trade agreement.



Table 1 Summary table of benefits

Millions of dollars, PV = 6%

Country/ region	Present value		Average yearly gain		Comment
Potential benefits					
	Low	High	Low	High	
Taiwan	248	497	30	62	Taiwan is ready to engage
Singapore	199	507	24	63	Singapore has already set up the legal architecture
DEPA + 2 +1	3,996	8,029	490	1,004	The overarching architecture gives digital trade the green light.
China	3,302	12,032	405	1,584	How China approaches digital trade is pivotal
USA	1,225	2,461	150	308	The US position in world trade institutions means that they also have a pivotal role in the development of digital trade
ASEAN	1,229	2,469	151	309	Mixed approaches are being adopted. Chinese adoption of digital trade will have a major positive impact
CP TPP	3,579	7,192	439	899	Major players are moving toward digital trade
UK	269	540	33	68	Stance unknown. Likely to be very interested
Staggered benefits over 10 years: APEC					
APEC	9,000	18,000	1,080	2,216	Per year from staged increase in digital trade

Source: NZIER

Caveats

Most of the assumptions are derived from New Zealand and overseas studies. These are characterised by major differences in definitions, measurement and evaluation methodologies; the broad indications of the drivers and magnitude of benefits are still relevant to New Zealand.

A key difficulty is establishing the 'baseline' or what would have happened in the absence of the deployment of digital trade. Some companies, because of their size or customer requirements, are well advanced down the digital trade track, and we assume that Fonterra is part of that. We have assumed that over the next ten years, that 40% of the digital trade gains will have already been achieved in the baseline. However, this may be an overstatement.

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1 Digital trade's time has come

TradeWindow is a developer of software solutions for entities working on the front line of global trade. They aim to continuously develop solutions that integrate to form a cohesive digital trade platform designed for exporters/importers, freight forwarders, customs brokers and other stakeholders.

Digital trade products developed by TradeWindow allows entities to conduct business-critical processes and securely participate in the global supply chain ecosystem. The supply chain ecosystem consists of customers, ports, terminals, shipping lines, banks, insurance and logistics companies, and government authorities.

Digital trade consists of digitally enabled or digitally ordered domestic or cross-border transactions in goods and services which can be digitally or physically delivered (Lopex-Gonzalez and Jouanjean 2017).

In the same way that long-run reductions in transport and coordination costs have supported the fragmentation of production along global value chains (GVCs), declining costs of sharing information are helping reduce barriers to digitising international trade transactions.

There are several reasons why this is beneficial not just for TradeWindow but for all participants in the supply chain. These include:

- **Connectivity gains:** increases the ease of making further connections as trade increases and participation rates in trade increase.
- **Productivity gains:** digital trade fundamentally reorganises how businesses, governments and other supply chain participants approach their trade.
- **Visibility (transparency) gains:** having one source of truth – the source documents – cuts down the confusion and increases transparency for permissioned parties in the supply chain.
- **Predictability gains:** digital trade generates more data at lower costs. This data can be utilised to better predict demand for specific products.
- **Inclusiveness gains:** breaking down trading complexities will encourage more firms into trading.

The purpose of this report is to provide an understanding of the potential contribution that the TradeWindow services could make to facilitating international trade.

We have drawn on international and domestic studies in peer-reviewed journals, case studies, information from TradeWindow and those using digital trading modules in New Zealand, perceptions of digital trade within government, past assessments, and other sources.

The analysis is intended to give policymakers and those in supply chains an indication of the likely costs and benefits to assist in those contemplating the digital trade environment. There remain a number of important uncertainties on the benefits, so we have taken a conservative approach. As such, the depth of the cost-benefit analysis (CBA) reflects the initial scoping nature of the assessment, in line with good policy practice.



2 How did we get here?

2.1 It is not should, but how we move to digital trade

There is not really a problem per se with paper documents that accompany trade consignments. The point is that technology has developed better (lower cost, more reliable and more accessible) ways of providing all manner of assurance information to governments and supply chain partners associated with the movement of goods and services that are more secure and quicker.

We are only at the beginning of the digital trading era, although as a trading nation New Zealand is more open to and more advanced than other nations. It is quite clear that through digital trade, businesses and the workers they employ will be able to reach millions of new customers abroad more efficiently, more cheaply, and more rapidly than ever before.

The real issue then is not should we move to a full-blown digital trade environment but how we do so. There are likely to be different paths taken by different organisations. As a first step, this paper illustrates the possible gains from digital trade.

2.2 The gradual growth of digital trade

There are a number of reasons for pursuing digital trade initiatives both from a business and government perspective:

- The cost savings involved are significant. It has been estimated that in APEC economies, the range of cost savings could be between 15% and 45% depending on the current stage of digital trade initiatives in each country (United Nations 2014; UNCTAD 2020; Duval 2017; WTO 2015).
- Reduced costs of trade will most likely increase trade, increasing profits and government revenues. Digital trade reduces the barriers to trade (United Nations 2017).
- According to Lopex-Gonzalez (2021), it includes:
 - Increased **traditional trades** (lower trade costs) across all sectors (natural resources, agri-food, low-tech and high-tech manufacturing and services).
 - More **digitally ordered parcels** domestically and crossing borders, with implications for MSMEs (Micro-, small and medium-sized enterprises) and SMEs (small and medium-sized enterprises), individuals (making trade more accessible) and Customs and related authorities (managing an influx of perishable goods).
 - More **digitally delivered trade**, including new services (e.g. intermediation or cloud computing services) and smaller value services (Apps), often delivered through new technology (platforms).
 - More **bundled or 'smart' products** combining the characteristics of goods and services and constantly connected
 - More **cross-border data flows** that underpin all digital trade transactions but raise new issues (privacy, national security, intellectual property protection, cybersecurity, industrial policy).



- Security, transparency, and efficiency in supply chains will increase (Ha and Lim 2014).
- Digital support is more reliable. Using paper with ‘wet’ stamps and signatures introduces human error, creating hold-ups and stalls the movement of goods (APEC 2010).
- Digital trade reduces border delays (United Nations 2014; APEC 2010).
- Digital trade can re-engineer procedures, increase transparency and accountability, and improve governance (United Nations Economic Commission for Europe 2006).
- MSMEs and SMEs will experience cost reductions and simplification of procedures, becoming more competitive, particularly with perishable goods (OECD 2019b).
- Digital trade lends itself to improved risk analysis, which helps prevent fraud and non-compliance (United Nations Economic Commission for Europe 2006).
- Digital trade brings in a degree of automation that improves and better utilises skilled labour for productivity gains (OECD 2019a).
- A shift to digital trade improves the reliability of data enabling better informed decisions and better forecasting of demand (OECD 2019a).

The main barrier to a movement toward a digital trade environment are costs and a lack of understanding. While these costs are small, they are fixed and tend to be a higher proportion of MSMEs and SMEs budgets than for larger companies. So while it makes business sense to transition smaller businesses, they can be reluctant to transition as they are typically short of cash.

These issues are significant barriers and will be examined in more detail later in this paper. In brief, this problem can be mitigated by:

- An outreach programme to MSMEs, indigenous firms/entities, and women-led firms by regulatory authorities detailing how to go about approaching a paperless interface. This will address the lack of understanding.
- Demonstrating – possibly using MSME case studies – the value-add for all stakeholders of increasing paperless trade. This is necessary since many small companies have preconceived fears of exporting. There is a need to dispel those fears and demonstrate how in practice, they can navigate the hurdles.

It comes as no surprise to those working in the supply chain that the cost reductions are significant. Examples given at a recent virtual APEC seminar in Wellington showed that a single shipment could pass through 30 different organisations, with up to 200 communications about that shipment. These communications are impeded if they use systems that do not talk to each other, e.g. pieces of paper. If a form is missing or there is a problem with some information, then delays are inevitable.¹

2.3 Government to government processes increase complexity

Cross-border movement of data is a key prerequisite of trade. It is the data flow that identifies the specific trade, authenticates the products involved, allows for payments, coordinates logistics, and is the key component for trade facilitation automation.

¹ Comment made in a recent APEC Paperless Trade seminar, 18th June Wellington 2021.

It is this movement of data that allows firms of all sizes to participate in trade. And as trade grows and becomes more specialised, it is increasingly important to participate in cross border trade to ensure firm growth and survival.

For some governments, this is highly problematic since:

- It creates challenges for government entities within a country/region and requires sharing information across borders with other governments (which will require a new legal framework). Many of these organisations have done things the same way for decades, and it is a challenge for them to change, i.e. in some countries, we are seeing attempts to go back from digital methods to paper-based trade as the pandemic recedes.
- There are vested interests within regions that benefit from paper-based processes for exchanging trade data and will oppose digital trading since it removes barriers to competition and introduces more transparency.
- There are concerns about the use and, especially the misuse, of data, amplifying the need for privacy protection, digital security, intellectual property protection, regulatory reach, competition policy and industrial policy.

As a result of the data security point, regions have been adopting and adapting regulations addressing the movement of data, often introducing new measures that put conditions around the movement of data across borders or, in some cases, measures that mandate that data is stored or processed in specific locations (data localisation).

To control cross border data, there has been a patchwork of rules and regulations implemented, making it difficult to consistently and effectively enforce public policy goals such as privacy and data protection across different jurisdictions. And it is also more of a challenge for firms to operate across markets, affecting their ability to internationalise and benefit from operating on a global scale. The internet is global and borderless, but regulations are not.

Governments have started to use a range of instruments to ensure that, upon crossing a border, data is granted the desired degree of protection or oversight. However, there is no single mechanism to enable what has come to be called 'data free flows with trust'.

Supporting this are:

- A range of unilateral mechanisms for safeguarding cross-border transfers. Most countries incorporate some form of safeguard into their data transfers, but they go about it differently.
- Plurilateral arrangements that aim to generate consensus around privacy and personal data protection, including in relation to international transfers. New Zealand, Chile and Singapore have signed the Digital Economy Partnership Agreement (DEPA), with the Republic of Korea and Canada looking to join. The DEPA aims to take advantage of digital trade opportunities.²

Increasingly more trade agreements are starting to take account of international digital transactions, with a good number having binding commitments on data flows. There is also more consensus among governments on the dual goals of protecting data and facilitating trade flows across borders.

² China has also signaled that it wants to join the DEPA.

More convergence is also occurring around the principles underpinning domestic privacy and personal data protection frameworks. Instruments used to control cross border trade are also becoming more standardised. The emerging international agreements underpin this.

This convergence is critical since the aim is to ensure that closed systems do not emerge, and interoperability is built into existing and new systems. This is a key driver for the digitisation of trade information flows (along with security).

2.4 COVID-19 presented an opportunity for business and government

Maintaining trade during the pandemic has been a major challenge for governments. As a result, there has been a major slow down in the supply chains as lockdowns and illness stopped staff coming to work, and freight capacity was severely reduced.

In 2020 and 2021, the impact has been dramatic, and trade volumes plummeted. All modes of transport are being impacted:

- Most airfreight travels in the holds of passenger planes. These planes virtually stopped overnight as the pandemic took hold and travel stopped. Air freighters have experienced strong demand, and as a result, their prices have risen dramatically.
- Processing of paper documents relied on air services. With the curtailment of air services, goods were stuck in ports all over Asia without the right documentation and little chance of paper documents reaching their intended destination.
- Sea-freight is the main transport mode for international trade – it literally does the heavy lifting. Cargo trade slowed dramatically as the pandemic reduced the number of people on wharves, some dockings were reduced, and some crews were quarantined.

An encouraging consequence of the disruption of the processing of paper-based trade information flows has been the rapid introduction of digitalised trade initiatives under temporary (crisis) legislation and the urgent roll-out of automated processes underpinned by new technology.

This has accelerated the adoption of digital trade beyond what was envisaged at the end of 2019 (McKinsey & Co 2020, Liang 2020). McKinsey & Co assert that the pandemic has pushed digital transformation forward by at least three years (McKinsey & Co 2020).



3 System design: trust is everything

Providing the multiple benefits described in this paper requires complete trust in the systems used. Without that trust, the benefits are severely curtailed or are unable to be realised.

Before we look at the various systems that enable trust, it is important to emphasise the critical relationship between value creation and trust.

The literature starts with the premise that lack of trust creates transaction costs as data has to be verified by cross-checking. Contracts are used to forestall opportunistic behaviour from counterparties and other players, often by adding bespoke processes for checking compliance and imposing penalties for non-compliance.

It follows that the role of trust can be used to negate the need for contractual terms or at least create a common, widely accepted standard for these terms – this is particularly useful if the parties are repeatedly transacting with each other. This also can be seen as a form of competitive advantage that others cannot replicate simply in supply chains.

3.1 A reduction in transaction costs

The development of trust improves the ease of trading (trade facilitation) and has a specific economic benefit since it reduces transaction costs in supply chains.

The study of transaction costs in economics is closely associated with Williamson (1975; 1985) and North (1990) Transaction costs can be defined as:

“...costs associated with conducting exchanges between firms... {these} ...can be search and contracting costs [and] contracting costs, or monitoring and enforcement costs.” (Dyer and Chu 2003)

Trust can be described as the lubricant that improves trading conditions (Lorenz, 1998). In transactions, contracting parties can act opportunistically to the detriment of the other party. The presence of trust can avoid the difficulty and expense of drafting comprehensive agreements to avoid such opportunistic behaviour.

3.2 Trust reduces risks

Risk reduction is another benefit of trust since it reduces uncertainty around transactions (Yeung et al. 2009, Wang et al. 2011, cited in (Zhang and Huo 2013)).

Trust is critical for mitigating exchange hazards and engendering cooperation among the supply chain partners since it reduces the uncertainty of a partner’s actions. Digital trading techniques can reinforce trust with structured payments as goods move from one port to another.

Zhang and Hou (2013) further find that researchers consider trust relationships as crucial for supply chain integration. Once developed, it can be a critical tool in supply chain management. It also can be mutually reinforcing, opening up other trade opportunities.



4 The opportunities – getting the best out of a COVID situation

The pandemic has caused major changes in government, business, and individual perceptions of trade and how it can be conducted. The New Zealand government has signalled that it wants:

- To operationalise trade agreements such as the DEPA to drive digital trade initiatives.
- Trade agreements to require open systems that allow all permissioned parties entry into the digital trade system. The key to an efficient trading system is interoperability that allows digital data to flow across different digital platforms.

The mix of government and private sector engagement required to deliver open systems has not been determined and is likely to vary with the quality and maturity of international trade relationships and agreements. However, we know that digital trade offers very large benefits spread across the global value chain. These benefits are explored below.

4.1 The types of benefits that digital trade provides

4.1.1 Productivity improvements

Productivity gains are a significant benefit for all participants in the supply chain (GVC).

The TradeWindow product offering reaches back into a firm's accounting systems (the source) to collect the original documents that generate the trade. If permissioned parties are examining one set of documents (the single source of truth), it eliminates disputes about authenticity and the need for cross-checking. This is also helped by offering products that digitise internal operational processes (this has the potential to transform and shape a firm's trade document system).

Typically, in the back office:

- Exporters require the creation of export and compliance documentation. This includes phytosanitary documents.
- Freight forwarders and customs brokers require an enterprise resource planning system that organises day-to-day business activities.

In these types of digital systems, the productivity gains can come from avoiding mistakes in transferring data from one system to another or ensuring necessary documentation is prepared and accessible, providing a single source of truth with no duplication. It can also enable the re-organisation of a firm's back office to create an automated trading system.

There are one-off gains from an improved automated back-office system, short to medium term gains from moving resources away from export document creation to other activities, and continuous ongoing gains from innovation as the ability to trade becomes easier, and thus the opportunities for increased trade grow.

4.1.2 Improved connectivity

Increased connectivity can transform links between firms and countries and redefine the relationships between trade and competitiveness. These are otherwise known as 'network' effects. The more connections, the more opportunities that are possible.



We do know that poor connectivity can mean high costs, low speed, and high uncertainty and can increase the risk of exclusion from trade. Therefore, successful participation in trade requires efficient cross-border linkages and successful resilient and efficient domestic segments of supply chains.

As an example, IATA estimate that a 1% increase in air connectivity is associated with a 6.3% increase in exports and imports

In digital trade connectivity means that data can be securely shared with any permitted parties along the supply chain. This is a major step forward relative to wet stamped/signature paper trade. This is important because parties can trust that the data is accurate and free from being tampered with en route. Also, as a by-product, the data flows can be monitored remotely in real-time.

Communication along the marketing chain will be impeded if data cannot be transferred between systems (showing the importance of interoperability). In a paper trade, if there is a missing or mis-specified piece of information, delays occur.

Increased connectivity can also occur where an importer is in a situation of elevated risk. Trust with such an importer can be built up with staged payments. Money can be released for part payment as the goods reach certain milestones, e.g. goods are with the shipper, goods are en route, the goods have arrived, and then goods are released to the importer.

Therefore permitted parties such as banks, shipping lines, logistics companies, government agencies, customers and other supply chain participants are enthusiastically prepared to engage in digital trade arrangements.

In this respect, clearance times can be reduced dramatically. In a recent trial, border clearance of kiwifruit to Taiwan was reduced from two days to a matter of one or two hours.

Having all the documents in the same place and trusting those documents means that clearances can be made quickly.

4.1.3 Visibility (transparency) improves supply trade integrity

Visibility or transparency underpins the integrity of the supply chain and assures supply chain partners and government that the product “is what the label says it is”.

This is critical for government authorities since it ensures the product description and reduces the risk. This means they identify and stratify goods crossing the border according to their risk profile and tailor their monitoring resources to equate with that risk – this is an allocative (matching) efficiency gain for government.

As products become more tailored to niches within specific markets, importers, distributors, and customers demand more product specifications. This is particularly important for food and beverage markets since high value items are becoming more profitable. It is also becoming increasingly important for supply chain partners. As part of building a unique product offering, traceability is an integral part of the product story.

Digital trade assists in telling that story – the provenance story – around products since:

- Consumers want to know how a product is produced for a whole range of ethical reasons.



- Wholesalers want the information for compliance reasons – California, for example, has a chain of custody requirements – for goods imported – especially food.

TradeWindow digital trade captures this data, e.g. Greenlea Premier Meats have a customer in the United States called Pilot Brands. Pilot Brands require information on how the meat was handled at each stage right back to the abattoir.

In this respect, digital trade comes into its own with short shelf-life goods. Vaccines and food and beverage products benefit from accurate and detailed information that digital trade can provide for permissioned parties. In this way, visibility underpins and reinforces connectivity since surety of what is “in the box” speeds up delivery.

It is also not surprising that firms that produce products with a short shelf-life have been earlier adopters of digital trade processes and products.

4.1.4 Improves ability to forecast activity

Digital trade generates a lot of useful data that can be used to predict future demand. Data can be used to develop models to predict how demand at various points in the supply chain (or GVC) behave. This is important since:

- Those that can forecast more accurately the underlying business drivers (both external and internal) are better able to respond earlier.
- Increasing disruption means that traditional methods relying on historical patterns are less relevant. Digital trade data is grounded in more granular data specific to the trades that companies wish to forecast.
- The growing complexity of supply chains (including volatility) means that the data generated by digital trade can make sense of the new business realities.

Smart software has the potential to improve productivity gains by improving tracking systems, enabling companies to optimise logistics, forecast demand more accurately and make supply chains more resilient. This leads to better decisions that improve the marketing chain efficiency, e.g., ensuring you have access to shipping containers in a timely fashion (Deloitte 2020; J. Holbein 2021).

4.1.5 Trade for all could come closer to reality

The New Zealand government has a ‘trade for all’ agenda to ensure that a spread of New Zealanders can participate in trade. The agenda considers a large number of MSMEs and SMEs that could potentially be involved in exports.

While the benefits of digital trade are well known, there are barriers to take up by MSMEs and SMEs:

- Fear of the unknown. It is sometimes difficult to know where to start. Being overwhelmed means they are reluctant to spend money on systems that will connect them to digital systems.
- Resources are required. Many MSMEs and SMEs suffer from a lack of capital. They do not have the capability (understanding and clarity) to take advantage of digital trading systems. So, it makes it hard to export, but it also makes it difficult to develop and connect with customs procedures that change as trading conditions change.



- A lack of support. MSMEs and SMEs do require more assistance to connect with digital systems. Where bigger companies can employ staff that specialise in this area, MSMEs and SMEs do not – it must be part of someone’s role. Effective participation of MSMEs/SMEs requires tailored assistance.
- Working guides. There is a lack of detailed ‘how-to guides’ or examples of how other MSMEs/SMEs go about entering a digital trade environment.
- Coping with services. For indigenous companies, physical goods may only be part of the offering they have. They may have an interest in exporting IP, which needs to be protected.

Underpinning these issues is confidence in a new system and the capacity to recognise and realise the potential benefits. Confidence is hard to earn, must be built up over time, and is very easy to lose.



5 TradeWindow products that support digital trade

5.1 The design of TradeWindow's offering is underpinned by trust

The design of TradeWindow products starts with the need for the development of business trust. Trust is not a commodity but requires a demonstration to prospective clients of reliable delivery on commitments which builds the confidence in the system that is the basis for trust.

To establish credible commitments, TradeWindow has embarked on a deliberate strategy to engender trust from market participants. This credibility building comprises reputable shareholders, system integrity, and compatibility with government objectives, systems, and processes.

As part of this strategy, TradeWindow has acquired the following certifications:

- ISO 9001 quality management systems. This shows the business operates internally in a way that the products meet customer and regulatory requirements.
- ISO 27001 security standards. The information security management framework includes all legal, physical and technical controls involved in TradeWindow's information risk management processes.

TradeWindow's shareholders required its processes and systems to be subjected to penetration testing by a reputable IT advisor as part of its security calibration.

Because of its bank connections (both shareholding and professional dealings), extensive due diligence, endorsement by regional government and central government, and its international connections, TradeWindow has been admitted to a number of organisations that provide further endorsement of its credibility and capability:

- The international bank messaging network (SWIFT). This means that they can intercept and read bank messages. It means they can provide permissioned supply chain participants with faster notifications on letters of credit being issued.
- Participation in trials/pilots that demonstrate the speed of digital trade processes, e.g. a trial of kiwifruit to Taiwan, reduced border hold-up times from 2 days to a matter of a few hours.

TradeWindow has developed a suite of products that rely on trust to create digital trade services. These can involve:

- Simply entering data
- Tracking shipments in real-time around the world
- Showing the provenance around a product in the supply chain.

TradeWindow recognises that interoperability is a key issue within the system. *"My customer's customers may be operating a different system"*, which means to operate efficiently (i.e. satisfy the needs of my customer), all systems need to be able to communicate with each other.

To capture the benefits of digital trade, TradeWindow has developed several products tailored towards customer types.

See Appendix A, which sets out how TradeWindow products interconnect.



5.2 Cube is the core of TradeWindow digital trade offering

At the core of a suite of TradeWindow products is Cube. Cube enables supply chain partners to securely share the data directly from their financial systems with permissioned parties. These parties can include banks, shipping lines, government agencies and other supply chain partners. Other products offered by TradeWindow are essentially an add on to Cube.

Its advantages are:

- Security. Cube provides secure access for permissioned parties and is based on blockchain technology. It mitigates the risk of documents being tampered with.
- Government recognition. The approach taken by TradeWindow and other like organisations (in New Zealand and overseas) is sanctioned and promoted by selected governments.
- Stakeholder buy-in and collaboration. This helps bring partner trust and confidence, reducing transaction costs.
- Seamless integration with clients' core accounting systems. This allows for a single source of truth based on the original documents that generate the trade.
- A suite of customised documentation solutions described in more detail below.

5.3 Systems that work hand in hand with Cube

These systems aim to simplify and streamline export compliance, reduce errors, customise export documents (can include phytosanitary documentation), and provide direct integration with authorised supply chain participants. These products include:

- Prodoc. A customised set of export documents required for digital trade. This reorganises the information necessary to ensure export compliance. This is TradeWindow's main digital trade product.
- For freight forwarders (Freight) and customs brokers (Speedy), TradeWindow has created an enterprise resource planning system to assist in the efficient movement of digital documents.
- Express doc. A generalised version of prodoc for small companies getting into trade (typically with small volumes). It reaches into the Xero accounts of a company to create the export compliant documents required. TradeWindow also offers a mentoring service that assists companies to organise their export process and associated documentation.

5.4 Products that create further value

These products are essential in conducting digital trade since they share information with supply chain partners in a form compatible with digital formats. Other products that bolt on to Cube include:

- **Origin** automates the certificates of origin for FTA and non-FTA regions. It increases the speed of processing, assisting with connectivity.



- **Assure** provides end-to-end traceability that allows firms to detail how products are made, transported and stored. It also has functions that make it difficult for products to be counterfeited.
- **Booking** manages ocean schedules and manages bookings that reduce errors, provide updates on container events and arrival times, is consistent with manifest filing rules and connects with all major shipping companies.
- **Finance** manages the exchange of documents and efficient payment systems and can provide access to finance.
- **Insights** is a planning tool that uses real-time demand data to assist in forecasting purchasing behaviour so that companies can match resources to when demand is likely to occur.

5.5 Supporting a single trade window

Digitisation of trade information can dramatically improve the efficiency of trade and offers possibilities for new trades. Like other areas which have been slow to adopt integrated systems that update in real-time (e.g. health), a more powerful story about the opportunities of increased trade (i.e. increasing trust for all permissioned parties) can be developed as the system is adopted and its benefits are demonstrated.

Also, like health, there are strong forces that are challenged by digital trade. One strategy to overcome reluctance is to demonstrate how digital trade works. The primary way to develop this type of demonstration effect is to connect with like-minded jurisdictions. Taiwan and Singapore are prime candidates.

Singapore is leading the way. They have approved laws that set out how digital trade can operate (i.e. is legally binding). By connecting with Singapore through the DEPA, New Zealand intends to develop a digital approach to trade that can be replicated more widely. While this approach has yet to be developed, it will be a whole of government undertaking that involves identity security, phytosanitary and other requirements for short shelf-life products, and the requirements of Customs.



6 Digital vs paper trade

6.1 Introduction to the approach

We have used a cost-benefit framework (CBA) to examine the value of digital trade if rolled out to all New Zealand trade.

CBA is a long-established technique intended to identify the economic efficiency of a proposed project or policy change. Efficiency is broadly about maximising outputs obtained from available inputs, but there are different variants used in economics:

- Technical efficiency refers to the most cost-effective way of providing a given service, for instance, reducing the cost of paperwork for trade per consignment.
- Allocative efficiency refers to the ease with which resources can move across an organisation to their most productive uses. For instance, reducing paperwork also means organisations can focus on new services or find ways to improve existing services for customers.
- Dynamic efficiency refers to innovation and changing to new activities over time.

If the introduction of digital trade innovations can reduce business trade costs, it will improve technical efficiency. To the extent that it shifts resources from one less productive activity to a more productive activity, it also improves the allocative efficiency of resource use. If it also allows new, more efficient ways of trading, then it improves dynamic efficiency over time.

A CBA proceeds by comparing effects and outcomes associated with introducing new technology against what would have occurred under a counterfactual, i.e. without digital trade. This counterfactual can be described as projecting the status quo into the future as supply and demand conditions change.

Digitisation improves the efficiency of trade information flows through the following effects:

- Connectivity refers to the ease of making other trade connections and building a network of connections. The easier that trade becomes, the more likely volumes will increase of both imports and exports
- Visibility and traceability of the transaction by permissioned parties cuts down on confusion and underpins confidence in the documentation of the product being traded
- Predictability refers to the amount of fine-grained trade data generated by digital trade. Using this data to predict the impacts of disruption or just narrowing the confidence intervals around demand forecasts can significantly benefit firms
- Inclusiveness refers to the ability of digital trade to lower barriers to entry to trade. If trade is easier, then participation rates by SMEs and MSMEs can be higher, allowing them to reduce risks and potentially increase revenue.



6.2 The counterfactual

In setting up the counterfactual, we need to consider:

- What baseline do we use? This is relatively straightforward since we are comparing a situation with and without digital trade. Although some large New Zealand firms must be some way along the digital trading adoption spectrum, the government has assisted this process by developing a single trade window and developing the secure export scheme (SES). This means we have adjusted the benefits (reduced them) to take account of these progressive processes. To be conservative, we have reduced the benefits expected by 40% over the next ten years
- Uncertainty about the impact of initiatives that would emerge without digital trade.

There may be a number of credible counterfactuals. The one we assume here is open to question and should be treated as a ‘work in progress’. We treat the counterfactual here as a tentative ‘peg in the ground’.

We assume that initiatives such as those set out by TradeWindow were not available, then paper trade would be the dominant way of trading. Although we acknowledge that some exporters will already have in place systems similar to or close to digital trading systems, e.g. given the size and frequency of Fonterra’s dairy trade, you would expect that there are many systems adopted by Fonterra that are close to digital trading systems. We are also aware of other big exporters moving towards digital platforms in the near future.

Regardless, under the counterfactual, firms are likely to pursue their own initiatives to reduce costs of trade. They will also incur costs of investing and running the associated systems and processes.

A lack of information means we cannot identify such actions and thus cannot identify these costs and effects in any credible way. Instead, our approach assumes that both the full costs and the full benefits would not have occurred in the absence of digital trade management.

6.3 The players involved

This is a ‘partial’ CBA in the sense that some effects will be too difficult to quantify reliably. For instance, there may well be a benefit to society from a rise in the quality of digital trade service – since more taxes may be paid on a higher volume of trade. While we can identify these benefits, given time and resources, it is not feasible to value them in economic terms.

For practical reasons, the analysis has concentrated on quantifying readily quantified and valued effects and describing the effects that cannot be readily quantified or valued in a qualitative way.

From the feedback from stakeholders, the experience of TradeWindow, journal articles and other published material, a number of costs and benefits have been identified that need to be considered in the CBA, whether they can be quantified or not. Four groups are considered to be important:

- Customers. The main benefits for customers are the potential to reduce waiting times, increased security, and an incremental improvement of being able to manage their businesses



- Businesses engaged in international trade. There are multiple benefits to the improvement of digital trade modules. It will improve efficiency, transparency, connectedness, predictability, and security.
- Government. This will assist government in its 'trade for all agenda' (by lowering barriers to trade) and allow them to focus on activities that support trade, such as outreaches to smaller firms and security of the trading system (see section 4.1.5)
- Third parties. Banks, logistics companies, and other permissioned parties will receive information more quickly, and it can be trusted. This will allow adjustments to their business models that improve efficiency



7 The benefits of digital trade

Paper-based trade systems have a number of significant drawbacks that mean that transferring to digital systems will result in substantial benefits. These benefits have been brought into stark contrast during the pandemic when it has not been possible to deliver the right paper (with wet signatures and stamps) to the right ports in the appropriate timeframe.

A description of these benefits has been set out in the previous section.

7.1 Valuing the benefits

We have used proxies from the literature and previous work to illustrate the impact of digital trade. The estimates are then calibrated to demonstrate the level of digital/automated trade already occurring, i.e. the more digital trade occurring now, the less the benefits as we move to a 'total' digital trade environment.

Below we set out the estimates for the various benefits.

7.2 Productivity

Improvements in productivity drive growth within an economy. Here we focus on three main areas where benefits fall and make some general estimates to understand the magnitude of benefits involved. These productivity estimates are based on the New Zealand Commerce Commission's experience when evaluating public benefits and detriments under the Commerce Act. The estimates involve examining the productivity gains from introducing digital trade (where paper trade existed) (NZ Commerce Commission 1988).

Three types of productivity gains are important:

- Technical (or cost minimisation/scale impacts). Digital trade provides a 'one-off' opportunity to reduce costs per unit of trade sales. This is a critical issue for New Zealand entities since we tend to be smaller in size, and the fixed costs can be significant barriers to entry. By creating a trading environment where businesses can almost seamlessly move between markets can reduce costs by as much as 10–12% (refer to the business case studies on TradeWindow's website)
- Allocative efficiency examines whether resources are applied to their best use and how those resources are used for different purposes (Matching). Maintaining the 'optimal' mix of resources is a difficult task for firms at the best of times. However, digital trade can assist this process since it automates skilled labour-intensive processes. This can take time to adjust, but it can benefit firms by at least 5–10% of turnover. These benefits are realised over 1 and 5 years.
- Dynamic efficiency, or innovation, is the most enduring benefit since it consists of a myriad of small, sometimes imperceptible changes to economies, industries, and firms that advance economic performance. Economics has yet to develop a way of generally assessing dynamic efficiency because of the data difficulties of measuring performance over time. However, since dynamic efficiency is about maximising the present value of current and future welfare, a dynamically inefficient economy will clearly have less



economic advancement over the long run. Digital trade can trigger dynamic efficiency gains of under 3% per annum³ on an ongoing basis.

(NZ Commerce Commission 1998)

7.3 Connectivity estimates

We have used the Value of Air Cargo report commissioned by IATA to benchmark connectivity estimates. One of their main conclusions from this report is that for every 1 percent increase in connectivity, a 6.3 percent increase in trade is expected (both exports and imports) (Developing Trade Consultants 2016).

The key point for New Zealand-based digital trade is the positive correlation between increased connectivity and trade. Further investigation into the IATA research and how it might translate to New Zealand suggests that the correlation will probably overstate the likely benefits for a 'market-distant' country with a small population. The full benefit may well occur if firms were situated in Europe or other parts of the world (even in some lesser developed nations), but it is unlikely to generate the same impact for New Zealand.

To further understand what benefits might occur for the New Zealand market, we tempered the estimates to reflect New Zealand's isolation and distance from markets.

NZIER (Williams and Maralani 2019; Williams, Maralani, and Welvaert 2020) has also examined the value of having a Mutual Recognition Agreement (MRA) with an importing nation. A trade MRA scheme is an agreement between two or more countries that allows for easy recognition of each other's border processes. This improves the flow of goods and services between those participating in the MRA, allowing for fast-tracking of customs processing. NZIER (Williams and Maralani 2019; Williams, Maralani, and Welvaert 2020) estimate that the time saved from these agreements for firms on border processing is half a day on average.

The impact of digital trade is broader than an MRA because it does not rely on having an MRA with the importing nation. Also, digital trade brings about a more fundamental change to a firm's processes allowing for a re-organisation of the structure of compliance that impacts connectivity in the following way:

- Import and export businesses. Mainly speed to market with fewer hold ups for all businesses.
- Logistics companies. Allows them to focus on other parts of their business that improve connectivity since the documentation processes are automated.
- For government, it builds on MRA initiatives, increases connectivity with other parts of government internally and builds trust and confidence with other governments, and allows them to focus on other areas that need attention
- Increased connectivity will also increase the possibility of further trade occurring. This will improve opportunities all along the marketing chain for all participants, including banking and insurance.

We have used an estimate of 1 to 2% of gross trade.

³ The Commerce Commission (1998) suggests that dynamic innovation costs are roughly 3% of gross output of an industry.



7.4 Non quantified benefits

There will also be benefits that assist companies to better understand the nature of demand for specific goods (predictability), visibility and transparency of the transaction, and lower barriers to entry into trade for SMEs and MSMEs.

Predictability improvements are based on the amount of fine-grained data that digital trade generates. This data can be used in algorithms to predict demand patterns for individual products more accurately as the supply chain changes (i.e., in times of disruption).

Visibility sets out the transaction transparently so that permissioned parties have access to one set of source documents. This avoids confusion about what was said in a particular email or phone call. TradeWindow also can track and trace goods that enhance the provenance of goods (by attaching the product history and storage) and mitigate against counterfeiting by recording when and where product bar codes are scanned.

Digital trade also encourages inclusiveness. By lowering the barriers to entry into trade, more firms, particularly MSMEs and SMEs, can participate.

We have not attempted to quantify these impacts; however, they represent important benefits that will sustain digital trade initiatives over time.

In the past, most of this information was expensive to collect, and therefore the cost of monitoring was high. Lowering the transaction costs associated with collection means that this data is now worth collecting: **radically lower transaction cost = obtaining benefits that were previously not obtainable, let alone at an affordable cost.**

7.5 The costs

The costs are all about obtaining the collective trust that digital trade brings. Businesses can be reluctant to incur additional costs of joining a digital trading process unless they see an immediate benefit or believe that benefits will occur over time. These issues can be significant barriers for smaller entities/firms. To mitigate these issues:

- Requires an outreach programme. TradeWindow has developed a programme (Academy) that assists MSMEs, and SMEs and a digital product called docs to help companies starting out on the digital journey. However, if the government is serious about their 'Trade for all' agenda, then some proactive programme/agenda is required to contact indigenous firms/entities and women-led firms.
- Involves demonstrating – possibly using MSME case studies – the value-add for all stakeholders of increasing digital trade initiatives. This is necessary since many small companies have preconceived fears of exporting. There is a need to dispel those fears and demonstrate how they can navigate the hurdles and make a success of the endeavour in practice.



7.6 Summary of costs and benefits

Assumptions for the analysis are set out in



Table 2.

The benefits focus on examining New Zealand export trade and are valued in terms of gross trade over 10 years. We have used a 10-year timeframe since it will take time before benefits are realised.

Each of the benefits impacts on a different part of the supply chain:

- Efficiency:
 - Technical (scale efficiency). It is likely that businesses involved in digital trade will be required to reorganise their Enterprise Resource Planning (ERP) system. The ERP integrates management software that manages and integrates a company's financials, supply chain, operations, commerce and reporting. Digital trade packages use the source documents from the ERP system and put them in a form that importing authorities and other permissioned parties will recognise and accept. This eliminates document errors, prevents documents going missing, stops blockages in the supply chain at the border, and provides documents that can be trusted as the single source of truth by permissioned parties. This is a "one off" significant gain of between 10% and 12% of trade turnover to supply chain participants
 - Allocative (matching efficiency). Over time skilled staff can be moved to other parts of the business since issues such as mistakes, missing documents, and other misunderstandings are eliminated through digital trade. A firm, government, and other permissioned parties in the supply chain will also move its capacity and resources to more productive activities. This is worth between 5% and 10% of turnover over the medium term (1 to 5 years)
 - Dynamic (innovation). The ability of firms, supply chain partners and government to focus on other issues will also increase innovation in the supply chain. These are small sometimes imperceptible improvements that drive supply chain partners work on a day-to-day basis. Described by some as the "gentle wind" of innovation it is on-going. This is worth between 1% and 3% of trade turnover annually.
- Connectivity gains. Trade begets trade – connectivity is strongly correlated to increased trade. The easier it is to trade the more trade will occur encouraging more participants and opportunities. In this way the shift to digital trade works in tandem with dynamic innovation since increases in trade will generate more opportunities. Connectivity gains are worth between 1% and 2% of trade turnover annually.

Costs revolve around assisting small businesses into the digital trading environment. These costs fall on business and government since they will need to develop programmes that help small firms' transition to digital trade. They have been omitted from the table.



Table 2 Assumptions that drive the analysis of benefits and costs

Benefit/cost	Low estimate	High estimate	Comment
Benefits			
Productivity gains			
Technical (scale)	10%	12%	One-off gain as entities transition to digital trade
Allocative (matching)	5%	10%	Medium-term gain over 5 years as firms gradually shift resources to areas of need
Dynamic (innovation)	1%	3%	Continuous innovation that drives the entity forward
Connectivity gains	1%	2%	Continuous since easier access to trade increases trade

Source: NZIER

Table 3 uses export trade between New Zealand and specific trading partners and groups of partners to illustrate the benefit impact of digital trade. Several assumptions have been made:

- Gross export trade has been used to illustrate the likely benefits. We have assumed that trade will increase in each region by 2% per annum over the next ten years. This is conservative.
- A 6% social discount rate has been used over the 10 years since gains do not just accrue to the businesses involved in the specific trade. Benefits accrue to governments, importers, logistics companies, importers and the consumers.
- We have only considered exports from New Zealand and focused on the importance of perishable trade since the faster perishables move along the supply chain, the higher their quality in the market.
- We have adjusted the benefits to factor in that some companies already use digital trading techniques in some of their processes. To be conservative, we suggest that 40% of the benefits have already been obtained.

To illustrate the benefits, we have targeted three regions/countries and country groupings (see Table below). These are:

- Taiwan, since the first pilot, was conducted between New Zealand and Taiwan last year, focused on kiwifruit.
- Singapore, since it has already passed laws that mandate the use of digital trade and as an entrepôt, has the potential to speed up digital trade usage in the Asia Pacific region.
- Members of the DEPA trade agreement (New Zealand, Chile, and Singapore) plus two countries intending to join the DEPA (South Korea and Canada). The DEPA provides the architecture under which digital trade can be established and flourish.
- A staged approach to digital trade in APEC where full benefits occur in year 10. This is to recognise that not all countries are likely to move to a digital trade environment immediately.



We have also provided benefit estimates for other regional groupings and countries in Appendix A. This includes ASEAN, CP TPP, RCEP, United States and the United Kingdom.

The benefits are substantial since digital trade has the potential to fundamentally reorganise the way that businesses approach trade, how governments intervene, increase the participation rates in trade (especially important when most firms are SMEs), and the ability to generate reliability, trust, and certainty.

For APEC, if all countries/regions joined a digital trade environment over 10 years the likely gains for New Zealand supply chain participants from New Zealand's exports would be between \$NZ9 billion and \$18 billion. Given that New Zealand's exports are approximately \$61.5 billion currently this is a considerable benefit. Note that not all of this benefit would go to New Zealand businesses, there will be benefits all along New Zealand's export supply chain.

Table 3 Summary table of benefits

Millions of dollars, PV = 6%

Country/ region	Present value		Average yearly gain		Comment
Potential benefits					
	Low	High	Low	High	
Taiwan	248	497	30	62	Taiwan is ready to engage
Singapore	199	507	24	63	Singapore has already set up the legal architecture
DEPA + 2 +1	3,996	8,029	490	1,004	The overarching architecture gives digital trade the green light.
China	3,302	12,032	405	1,584	How China approaches digital trade is pivotal
USA	1,225	2,461	150	308	The US position in world trade means that they also have a pivotal role in the development of digital trade
ASEAN	1,229	2,469	151	309	Mixed approaches being adopted. Chinese adoption of digital trade will have a major positive impact
CP TPP	3,579	7,192	439	899	Major players are moving toward digital trade
UK	269	540	33	68	Stance unknown. Likely to be very interested
Staggered benefits over 10 years: APEC					
APEC	9,000	18,000	1,080	2,216	Per year from staged increase in digital trade

Source: NZIER



8 Implications

Of the components of digital trade that could be quantified, results suggest substantial benefits for supply chain partners. Using export data from New Zealand, the principal parts of the quantified analysis are:

- Large 'one-off' benefits from moving from paper-based systems to digital systems
- Ongoing efficiency and connectivity benefits that continue as barriers to trade are broken down
- Ongoing benefits from generating large amounts of data at low cost that improved the predictability of likely demand
- Increased inclusiveness as more businesses are able to overcome the complexities of trading
- Costs associated with tooling up and learning new systems
- Costs of overcoming the unknown. Most New Zealand businesses are SMEs or MSMEs. Enticing some of these firms/entities into trade will require time and outreach by business and government. Understanding their concerns and capabilities is key to unlocking their potential.

We must stress that there are limitations in the quantified analysis due to the information available on different aspects. The robustness of the analysis is influenced by the potential bias in the information provided and the unique trading position that New Zealand is in (i.e. distanced from markets and small population size).

The figures in this report should be regarded as an order of magnitude calculation rather than a definitive measure, and the analysis can use improved information if it becomes available, i.e. as more case studies come to light more evidence on specific benefits will be available.



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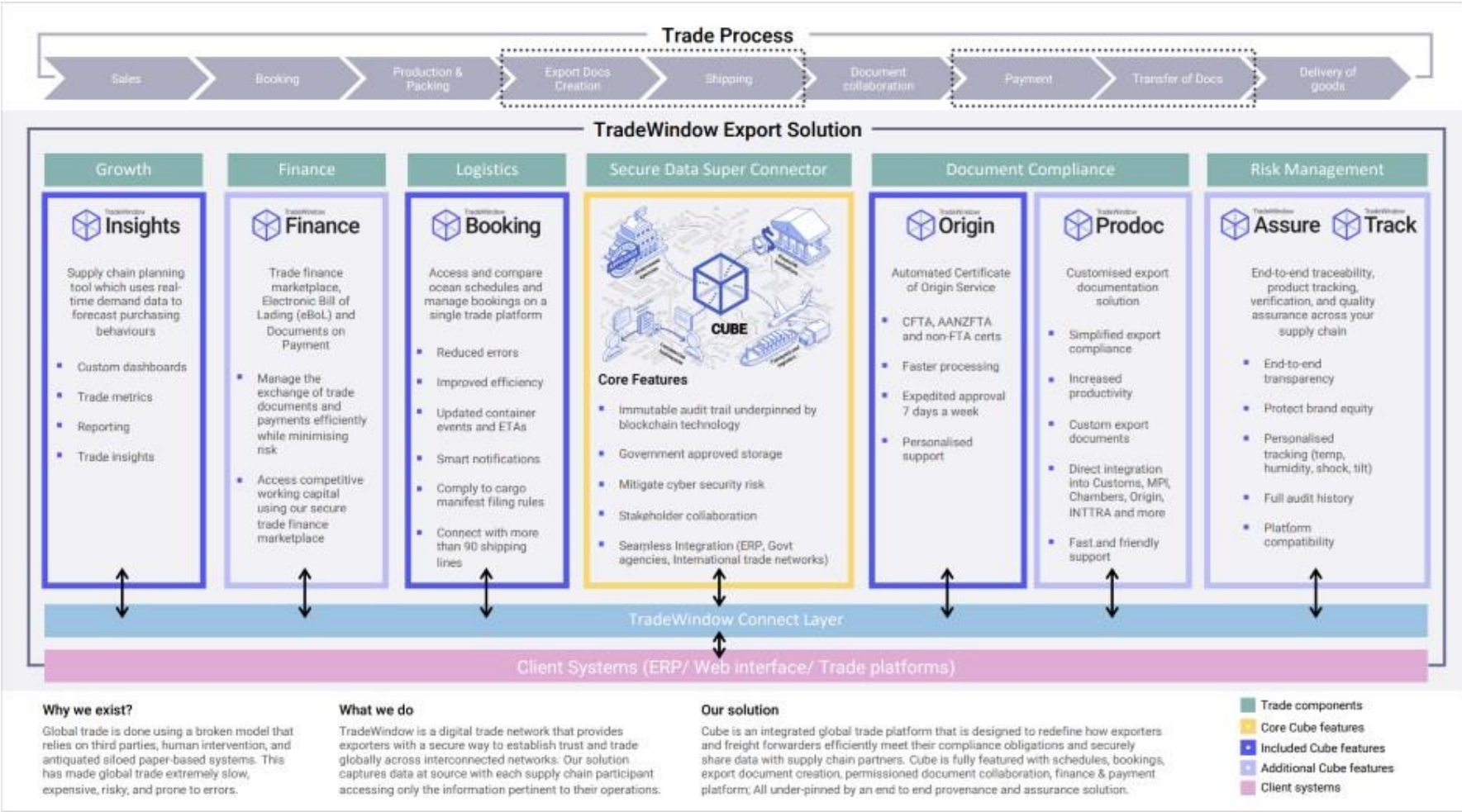


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Appendix A Impact of digital trade

Figure 1 TradeWindow's products



Appendix B Benefits of digital trade for selected countries

Table 4 Summary table of benefits

Millions of dollars, PV = 6%

Country/ region	Present value		Average yearly gain		Comment
	Low	High	Low	High	
Taiwan	248	497	30	62	A keen and willing participant in digital trade
Singapore	199	507	24	63	Has already the legal framework in place for digital trade
DEPA + 2	694	1,394	85	174	A natural starting point for the region
CP TPP	3,579	7,192	439	309	The larger the participation rates larger the gains for all
RCEP	6,948	13,960	851	1,746	Similar to the CP TPP and APEC
APEC	8,817	17,716	1,080	1,746	Similar to the CP TPP and RCEP
ASEAN	1,229	2,469	151	309	Not all ASEAN economies are running at the same speed
United States	1,225	2,461	150	308	United States is very interested in digital trade initiatives
United Kingdom	269	540	33	68	Potential for this to grow strongly
China	3,302	12,886	405	1,584	China has just applied to join the DEPA

Source: NZIER

