Chapter 5

The Role of Automation in Trade Facilitation

by

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This chapter analyses customs automation, one of the most powerful tools for increasing customs efficiency. It focuses in particular on benefits and implementation costs. It aims to contribute to discussions in the WTO Negotiating Group on Trade Facilitation. Cost estimates for customs-related lending projects show that the costs of implementing, maintaining and operating automated customs systems are substantial. However, the very great majority of WTO members have already implemented such systems and past experience shows that, over time, the financial benefits have very often exceeded costs. Among the various lessons learned from successful implementation of automated customs systems, two are particularly highlighted. First, automation should not be considered a panacea for facilitating trade; and second, commitment and financial sustainability are prerequisites for successful customs modernisation involving automation.

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Introduction

Issues relating to customs automation and the use of information and communication technology (ICT) in trade procedures have attracted considerable attention in WTO discussions of trade facilitation. Several developing countries have drawn attention to their lack of capacity to implement potentially new WTO trade facilitation disciplines. Although the type and magnitude of the costs involved in implementing trade facilitation measures are not fully understood, a substantial part is generally assumed to be due to automation. Automation does in fact give rise to significant implementation, operating and maintenance costs, but, as will be seen, the great majority of developing countries already have automated customs systems in their main seaports and airports. Prospective new trade facilitation disciplines are being discussed in the WTO Negotiating Group on Trade Facilitation (NGTF) and an agreement has yet to be reached. This chapter aims not to assess whether trade facilitation modalities could in any way be coupled to automation but rather to examine the role of automation in facilitating trade. Significant progress in trade facilitation can also be made in other ways (see Box 5.1).

Automation is not a requirement under the current multilateral trade facilitation disciplines of GATT Articles V, VIII and X, which have been in place for more than half a century. Nevertheless, non-binding recommendations or guidelines are quite frequent at the multilateral level (UN, 2001).[1] In the trade facilitation discussions that took place at the WTO Council for Trade in Goods (CTG) leading to the WTO Cancún Ministerial, some participants argued that most trade facilitation measures could be implemented without automation. Other participants argued that automation would be among the most important factors for ensuring the success of trade facilitation measures owing to its significant efficiency-enhancing impact on government border procedures.

1. Although the revised version of the World Customs Organization's Kyoto Convention (formally, the International Convention on the Simplification and Harmonization of Customs Procedures) recognises the importance for trade facilitation of making the maximum use of automated systems, it creates no obligation to make available or accept computerised data entry (EC, 2003a).

Box 5.1. Trade facilitation without automation

Automation is a powerful tool to facilitate trade but it is not an objective in itself. Automation only makes sense if it serves to support implementation of modern customs management practices. Plenty of trade facilitation measures do not require automation and some are already included in the current GATT framework. However, some provisions are poorly implemented in many countries and stricter adherence to existing rules and guidelines would greatly facilitate trade.

Publication of and easy access to information concerning trade regulations would greatly help traders, in particular small and medium-sized enterprises (SMEs). This could involve the establishment of single-window enquiry points with information on trade regulations and timely notification of new trade regulations. According to GATT Article VIII, customs fees and charges on imports should be limited to the approximate cost of the services rendered. Many countries still charge high *ad valorem* fees without ceilings for various purposes and services (OECD, 2006, Chapter 4). A stricter definition of how these fees should be calculated and what constitutes a valid "customs service" would further reduce trade transaction costs.

Trade formalities can be submitted to single-window environments that are not necessarily automated. Manual initiatives are less ambitious but nevertheless beneficial for both governments and traders. Costa Rica introduced a manual single-window system in 1994 with the aim of simplifying and accelerating import and export administration of foreign trade procedures. Risk management principles can also be applied by all customs administrations. Risk management requires the customs administration to have a clear understanding of the nature of existing risks and to develop practical methods to mitigate these risks, but automation is not a prerequisite (Widdowson, 2005).

The Dutch Ministry of Trade and Industry recently surveyed Dutch companies to investigate the type of trade facilitation measures that would make a direct impact on their daily operations. Three of the most common measures did not require automation. First, a central enquiry point would increase transparency and anticipation. Second, a move towards mutual recognition of inspection certificates would greatly facilitate trade, especially the removal of double sanitary and phytosanitary (SPS) inspection procedures. Third, traders (and customs authorities) would save on administrative work if customs authorities minimised requirements for non-standard documents.

There is a general consensus that automation can efficiently serve both public and private interests. Automation has the potential to facilitate trade while also helping to meet objectives related to the maintenance of national and social security. Smooth trade flows are essential in many countries that depend on just-in-time delivery and global supply chain systems. Predictable border services, customs clearance time and trade transaction

costs are important factors when companies consider investing or doing business in a country (see Chapter 3). From a public sector perspective, limited human resources and rapidly growing trade volumes have led to recognising the importance of automation for safeguarding and meeting budgetary, health, environmental and other social goals. Heightened national security concerns relating to the international movement of cargo following the terrorist attacks of 11 September 2001 have also encouraged further use of automation and ICT at borders. Automation serves purposes other than facilitating the movement of goods and people: added benefits may include reduced levels of smuggling and corruption, more productivity in customs operations, and improvements in valuation methods that may also lead to higher government revenue.

It is misleading to assume that all WTO members would be required to implement automation for government border procedures under prospective WTO disciplines on trade facilitation. It is not yet clear whether new obligations will arise and what form they might take. Thus, it may be early to discuss lack of capacity relating to automation. Although automation is not a pre-condition for trade facilitation initiatives, its great potential impact means that the issue is unavoidable when the cost of trade facilitation is discussed. Also, the benefits should be taken into consideration in any assessment of the role of automation in trade facilitation. This chapter aims to provide background information about automation issues that could be dealt with through possible WTO disciplines on trade facilitation and to contribute to discussions in the WTO NGTF.

The chapter first reviews cost and benefit analyses in the existing literature. It deals next with two other issues that are relevant for reducing costs and adding to the benefits of automation: namely, the lessons to be drawn from customs-related lending projects and emerging trends in ongoing initiatives and recently introduced trade facilitation measures in selected economies. A conclusion follows.

Cost-benefit analysis

There is a scarcity of reliable internationally comparable data that would allow for a detailed assessment of the costs and benefits of customs automation. This section therefore examines national trade facilitation experiences and shows the benefits resulting from overall trade facilitation efforts.

Costs

Customs automation gives rise to costs for both businesses and customs authorities. Few studies have attempted to estimate these costs owing to their complexity (Finger, 2000), although recent OECD work has made available the experience of several countries in this respect (see Chapter 6). This section draws mainly on data from customs-related lending projects and the OECD projects on costs of trade facilitation measures. As automation primarily aims at modernising customs procedures, with facilitation being just one aspect among many, the cost of automation should not be totally attributed to trade facilitation.

A narrower focus on customs procedures is adopted here because of the greater availability of data. Challenges relating to estimates of the cost of customs automation include:

- Costs vary significantly depending for example on the initial state of the border procedures and the desired nature and extent of automation. Cost figures are dependent on each country's unique situation.
- The implementation of automation presupposes the availability of related technologies, infrastructure, financial and human resources, and other conditions. For example, automation will not work appropriately without stable electricity supply and communication means or appropriate human resources for daily operation, management and maintenance (Box 5.2). Therefore, the cost boundaries are rather unclear.
- Without laws that recognise its legal status, electronic documentation must continue to be accompanied by paper documents. In this sense, an appropriate legal framework such as that relating to digital signatures needs to be established. It is often difficult to estimate the cost of changing laws and regulations.[2]
- Additional costs may be associated with procedural and organisational changes within both businesses and customs authorities (Finger, 2003).

2. Even if paper copies must be submitted afterwards, automated pre-arrival clearance drastically reduces delays.

Box 5.2. Constraints on implementing automation systems

While automation/computerisation can increase the efficiency of well-run operations, it is not a miracle solution to existing problems. Automation of customs procedures needs to be part of an overall modernisation project if it is to avoid the inappropriate introduction of computer systems that can exacerbate existing problems.

The successful introduction of automation requires careful planning, preparation and sequencing of a number of activities, including training of operators, procurement of hardware and the development or purchase of own or packaged software. Computerised systems are also dependent on reliable power supply, telecommunication networks, computer hardware suppliers and the availability of local maintenance services.

Several procedural considerations are crucial in automation projects. First, automation projects are heavily dependent on long-term political commitment – at both low and high levels – because automation projects may be resource-intensive, time-consuming and controversial. Second, prior adjustment or simplification and review of tariff schemes and customs legislation facilitate post-reform administration and remove many potential problems. New legislation may also be needed to introduce electronic signatures and encryption techniques as well as to ensure data security. Third, automation needs to be preceded by standardisation, consolidation, modernisation and simplification of the entire manual system and its procedures: simplification and streamlining of customs procedures and documentation, development of a self-assessment system, and planning and preparation for implementation.

Finally, automated systems need to be linked to a number of external sources, and issues relating to trade data interchange standards, telecommunication standards, security arrangements, etc., need to be negotiated and settled with trade participants, including importers, exporters, banks, seaport and airport authorities, shippers, brokers and freight forwarders. In addition, the potential introduction of single window systems imples a host of issues related to government inter-agency communication and institutional co-operation.

Source: Largely based on De Wulf and McLinden (2005) and Corfmat and Castro (2003).

Automation has been considered a critical part of most customs-related lending projects and was incorporated in over 90% (24 out of 27) of the technical assistance projects with a customs component funded by the World Bank between 1994 and 2002 (World Bank, 2005). Also, ASYCUDA (Automatic SYstem for CUstoms Data), developed and maintained by UNCTAD, had been installed in over 80 developing countries as of 2005.[3] According to WTO Trade Policy Reviews (TPRs)

3. See www.asycuda.org.

(2000-05), most WTO countries, including least developed countries (LDCs), have established customs automation systems, despite different degrees of development and coverage of the systems (see Box 5.3 for a discussion of the choice of automated system).

Automation normally entails substantial costs, in some cases amounting to over two-thirds of the total cost of a customs-related lending project. For example, the six-year budget for the Russian Customs Development Project (2003-09) was estimated at nearly USD 190 million, of which USD 133 million for customs automation (World Bank, 2003). The cost of automation accounted for 40% of total funding for the customs reform project in Tanzania and 60% in central and eastern Europe (Finger *et al*., 1999). The estimated cost of customs automation can be significant for governments, in particular in least developed countries. It can be drastically decreased, however, as use of the Internet eliminates the need for expensive hardware (World Bank, 2000).

According to UNCTAD (2002a), the cost is normally estimated at less than USD 2 million for the ASYCUDA system but can reach USD 20 million if a country develops an original system. In practice, the introduction of the ASYCUDA system required external funding of around USD 9 million in Bolivia (Gutierrez, 2001) and USD 5.5 million in Jamaica (Grant, 2001). In Turkey, the total cost of introducing the SOFI system was USD 32 million (World Bank, 2005). A survey commissioned by Japanese customs (CTB, 2001a) estimated the cost of setting up Korea's original automated customs system between 1992 and 1997 at around USD 24 million. One quarter of the cost was for programme development and management and the rest for hardware. The Royal Thai Customs invested THB 1 billion in 1997-2000 to introduce and install an information technology (IT) system in its central offices and an additional THB 400 million is budgeted for 2004-06 to migrate to an open Internet-based system accessible from all customs offices.[4]

Senegal developed a system for customs operation management (Trade X) between 1986 and 1990. In 2000-02 the system was upgraded to a Web-based version at a cost of EUR 3 million. Half of the cost was for investments in IT equipment. Ten professionals are currently employed to maintain, update and operate the system; the team's yearly cost is EUR 600 000. A recent three-year project to develop a single-window system (Orbus) cost EUR 610 000; the system is based on the IT infrastructure provided by Trade X installed at the customs headquarters. This system is operated by 18 professionals at an estimated cost of

4. Information provided by the Thai authorities.

EUR 600 000 a year. EUR 800 000 a year is collected in service charges. Senegal's customs website was developed over a six-month period at a cost of EUR 15 000.[5]

Automated systems incur substantial operating, maintenance and updating costs. It is reported that updating ASYCUDA software requires at least USD 2 million (Nathan Associates Inc., 2002). The operating and updating costs may be balanced by user fees or financed by governments. Haiti's upgrade of ASYCUDA to ASYCUDA ++ at principal customs offices cost USD 1.43 million. In Singapore, operating costs are covered by user fees, while updating costs are financed by the government. Chinese Taipei updated its air cargo clearance system in 2000 at a cost of USD 5 million, and its ocean-going cargo system in 2004 at a cost of about USD 6.5 million (WTO CTG, 2002). In the Philippines, updating the automated system from a DOS-based system to a Windows platform increased the costs of the modernisation project by 40% to a total of USD 27 million, most of which was used to purchase hardware and software (Bhatnagar, 2001).

Box 5.3. Off-the-shelf systems vs. in-house development of automated systems

The International Monetary Fund (IMF) (2003) argues that acquiring an existing software package such as ASYCUDA ++, MicroClear, SOFI, TATIS or TIMS is less costly than developing original software. Apart from the cost, there are advantages and disadvantages. The World Bank (2005) argues that off-the-shelf systems incorporate the most advanced technologies and give the assurance that the functions of the different system modules are stable and robust. Systems developed in house tend to be more expensive and are often not as well designed as those on the market. Widespread use, the availability of external expertise and the use of international standards are other advantages of off-the-shelf systems.

However, these systems also have some disadvantages, and lack of flexibility and the difficulty of changing or upgrading the system can be major concerns. Off-the-shelf systems may be available at competitive prices, or even be free, but inevitable long-run costs can significantly reduce their benefits. Reliance on external expertise makes implementing countries dependent on the future procurement of services. External service providers may have limited capacity to provide timely services or simply go out of business. Customs administrations may therefore choose to develop local IT expertise to gradually reduce the level of dependency on the service providers.

5. Information provided by the Senegalese authorities.

Benefits

Several countries' experience indicates that customs automation benefits both traders and governments. The extent to which the benefits are due to the introduction of automation is less clear. Effective implementation of modern customs procedures (*e.g.* risk management, pre-arrival processing and post-clearance audit), uniform application of national laws and regulations as well as the generation and analysis of customs data all enhance the efficiency of customs procedures, for example through the reduction of direct costs and delays. It also provides an effective anti-corruption mechanism owing to reduced face-to-face interaction between customs officials and traders. Several countries also have reported that customs automation has helped both to increase customs productivity and to tackle fraud, smuggling and valuation issues (see Chapter 3).

Some countries provide quantitative information on overall benefits, especially in terms of customs clearance time. According to WTO TPRs (2000-01 to 2005-06), customs clearance can be carried out quickly with electronic environments provided that all the requirements and paper formalities are in order. As Table 5.1 shows, the great majority of WTO members have implemented some kind of automated system. All OECD members and non-OECD EC members have automated customs systems and 83% of non-OECD members were reported to have automation systems implemented at the time of publication of the WTO TPRs.[6] UNCTAD's ASYCUDA and ASYCUDA ++ systems are installed in more than half (62 out of 110) of the reported developing and least developed countries. In some of these countries, automation is only installed in major seaports and airports, but covers most cross-border movement of goods, typically between 75% and 100% in terms of import value. Several developing and least developed countries have more than a decade of experience with the ASYCUDA system.

6. The WTO Trade Policy Review of the EC states that: "The uniform implementation of common customs procedures by EC member states has been a challenge due to variation in the availability of electronic access to customs…, limited interfaces for interoperability between systems, and different interpretation of EC customs legislation by national customs administrations…". It also states that "The challenge is being addressed within the context of the EC's 'Customs 2007' programme… [which] aims to ensure that member states' customs administrations interact and perform their duties as efficiently as a single administration; improve trade facilitation…".

Table 5.1. Customs automation and clearance time for imports in WTO members

Country	Year*	Automation	System**	Automation coverage	Clearance time (h)***	PSI
OECD mmbers						
Australia	2002	√		98%	…	
Canada	2003	√		…	…	
EC	2004	√		…	…	
Iceland	2000	√		95%	a few minutes	
Japan	2005	√		…	0.6-4.3	
Korea	2004	√		75%	1.3	
Mexico	2002	√		…	< 3	
New Zealand	2003	√		100%	0.2	
Norway	2004	√		…	0.05-0.08	
Switzerland	2004	√		90%	…	
Turkey	2003	√		100%	< 24	
United States	2004	√		96%	…	
Non-OECD mmbers						
Albania	…	√	ASYCUDA ++			
Angola	…					
Antigua & Barbuda	2001	√	ASYCUDA	…	24-72	
Argentina	…	√				
Armenia	…	√	ASYCUDA ++			
Bahrain	2000	…		…	…	
Bangladesh	2000	√	ASYCUDA ++	…	48-72	√
Barbados	2002	√	ASYCUDA ++	…	…	…
Belize	2004	√	ASYCUDA	…	< 72	
Benin	2004	√	ASYCUDA ++	…	< 24	√
Bolivia	…	√	ASYCUDA ++			
Botswana	2003	√	ASYCUDA	…	0.17-0.75	
Brazil	2004	√		…	30-40	
Brunei	2001	…		…	…	
Bulgaria	2003	√		…	…	
Burkina Faso	2004	√	ASYCUDA ++	98%	48	√
Burundi	2003	√	ASYCUDA	…	48-72	√
Cambodia	…	√				
Cameroon	2001	…		…		√
Central African Rep.	…	√	ASYCUDA			
Chad	…	√	ASYCUDA ++			
Chile	2003	√		100%	< 24	
China	…	√				
Colombia	…	√	ASYCUDA			
Congo	…	√	ASYCUDA ++			
Costa Rica	2001	√		…	1	…
Côte d'Ivoire	…	√	ASYCUDA			
Croatia	…					
Cuba	…	√	ASYCUDA			
Dem Rep. Congo	…	√	ASYCUDA			
Djibouti	…					

Country	Year*	Automation	System**	Automation coverage	Clearance time (h)***	PSI
Dominica	…	√	ASYCUDA			
Dominican Rep.	2002	√		…	48	
Ecuador	…					
Egypt	…					
El Salvador	2003	√	ASYCUDA ++	…	< 24	…
Fiji	…	√	ASYCUDA ++			
FYR Macedonia	…	√	ASYCUDA ++			
Gabon	2001	√	ASYCUDA ++	…	…	
The Gambia	2004	√	ASYCUDA	…	3-4	
Georgia	…	√	ASYCUDA ++			
Ghana	2001	√	ASYCUDA	…	24-48	
Grenada	2001	√	ASYCUDA	…	< 48	
Guatemala	2002	√	ASYCUDA	…	4-24	
Guinea	…	√	ASYCUDA			
Guinea Bissau	…	√	ASYCUDA			
Guyana	2003	√	ASYCUDA	…	< 168	
Haiti	2003	√	ASYCUDA ++	…	24-48	√
Honduras	2003	√	ASYCUDA ++	98%	24-72	
Hong Kong, China	2002	√		100%	…	
India	2002	√		75%	…	
Indonesia	2003	√		…	…	
Israel	…					
Jamaica	2005	√		…	< 24	
Jordan	…	√	ASYCUDA ++			
Kenya	2000	√		…	< 48	√
Kuwait	…					
Kyrgyz Rep.	…					
Lesotho	2003			…	48-72	…
Macao, China	2001	√		…	0.33	
Madagascar	2001	√	ASYCUDA	…	…	
Malawi	2002	√	ASYCUDA ++	…	48-72	√
Malaysia	2001	√		…	3-48	
Maldives	2003	√	ASYCUDA ++	…	< 2	
Mali	2004	√	ASYCUDA	95%	2-6	√
Mauritania	2002	√	ASYCUDA ++	…	48	√
Mauritius	2001	√		…	0.08-1	
Moldova	…	√	ASYCUDA			
Mongolia	2005	√	ASYCUDA	65%	…	
Morocco	2003	√		100%	0.87	
Mozambique	2001	√		…	…	√
Myanmar	…					
Namibia	2003	√	ASYCUDA ++	90%	2-4	
Nepal	…	√	ASYCUDA ++			
Nicaragua	…	√	ASYCUDA ++			
Niger	2003	√	ASYCUDA	…	…	
Nigeria	2005	√	ASYCUDA	…	48	√
Oman	…					
Pakistan	2002	√		…	24	√

Country	Year*	Automation	System**	Automation coverage	Clearance time (h)***	PSI
Panama	…	√	ASYCUDA			
Papua New Guinea	…	√	ASYCUDA			
Paraguay	2005	…		…	…	
Peru	2000	√		…	…	√
Philippines	…	√	ASYCUDA ++			
Qatar	2005			…	1-3	

*) The year of publication of WTO TPR.

**) The UNCTAD ASYCUDA or ASYCUDA ++ system is implemented or is being implemented.

***) The data reported typically refer to "average clearance time" or "clearance time in normal cases".

"…" no relevant information available in the sources mentioned below.

The ticked boxes indicates "yes"; and unticked boxes "no".

Source: WTO Trade Policy Reviews (2000 January - 2005 June); Chapters 4 and 6 in this volume; UNCTAD at www/unctad.org.

The data on customs clearance time reported in the WTO TPRs are based on government information rather than independent measurements by the WTO. This may be one reason why the clearance times reported in Table 5.1 are lower in many cases than the times reported in many independent surveys of traders.[7] For example, the authorities of Benin state that customs formalities take less than 24 hours but according to the WTO TPR private operators do not concur. Table 5.1 indicates that there is a great difference in clearance times between different countries with automated systems and even between countries with similar systems. For example, Guyana, which has installed an ASYCUDA system, reports clearance times below 168 hours but other countries with a similar system report average clearance times in low single-digit hours. This illustrates how important factors other than automation are in trade facilitation. Most developing countries with automated customs systems report that average customs clearance takes between 24 and 72 hours.

In Canada, the standard clearance time was 45 minutes in 2000, but most goods were cleared within seconds (WTO CTG, 2000). In Australia in 2000, over 98% of electronically lodged import entries were processed within 15 minutes (Australian Customs Service, 2002). Customs clearance

7. It is unclear from the WTO TPRs how clearance times are measured and if the authorities always use the same definition. Many of the figures refer to average customs clearance of cases where all requirements and paper work are in order. Other cases are less clear and simply refer to "average" customs clearance. This discrepancy and loose definition imply that any comparisons should be made with caution. The data reflect customs information provided over a period of five and a half years, and clearance times may have changed in some countries that have reformed their border procedures.

time was reportedly an average of four hours in Spain (OECD, 2000), 30 minutes in Greece (OECD, 2001), 14 minutes in France (see Chapter 4), and less than 24 hours in major cases in Mozambique (see Chapter 1). Thanks to the paperless trading system, average customs clearance time has fallen from 5.3 to 1.5 hours in Chinese Taipei, and from 12.2 to 1.1 hours in Mexico (DFAT, 2001). Morocco's automated system contributed to a reduction of the average clearance time from 132 hours in 1997 to less than an hour in 2002. Major effects of Peru's customs reform programme included a reduction in the release time from 360-720 hours in 1990 to 2-48 hours in 1996 (Wilson and Woo, 2002). Automated systems in Costa Rica helped to reduce the average customs clearance time from 144 hours before 1994 to 12 minutes for cases without inspection and 115 minutes for those requiring physical inspection in 2000. According to information provided by the Argentinean authorities, Argentina's reorganisation and the introduction of its Maria Informatics System helped reduce clearance time from four days to 24 hours. Box 5.4 describes further experience from time release studies.

Box 5.4. Time release studies in selected countries

Indonesia: A study of cargo clearance times at Tanjung Perak port Indonesia by the WCO found that the customs clearance process for certain shipments took an average of 6.4 minutes, compared to 159 hours and 23 minutes for other activities involved in cargo clearance. The main sources of delay included incomplete documents, red tape involved in releasing goods from godowns (warehouses), documentation errors, payment hold-ups and deliberate delays in delivery even after the release of goods by customs officials.

Source: Wilson and Woo (2000).

Japan: The latest Japanese time release study showed that sea cargo imported to Japan took 68.4 hours on average from port entry to customs entry declaration in 2001, ans 4.9 hours on average from customs declaration to permission. The study also showed that air cargo imported to Japan took 25.1 hours on average from port entry to customs entry declaration, and 0.4 hours on average for clearance time.

Source: CTB (2001b).

The Baltic countries: At the Fourth Baltic Sea Customs Conference (BSCC) in Vilnius in June 2001 it was agreed that a pilot study to measure the time for border crossing would be carried out in Estonia, Germany, Latvia, Lithuania, Norway, Sweden and Poland, and the crossings of more than 33 000 vehicles were measured. The result shows that border crossing time averages between 11 minutes and over 12 hours. The goal to reach two-hour border crossing was only reached in 50% of the measured border crossings.

Source: BSCC (2002).

The effectiveness of automation is more apparent when one compares customs clearance time for automated and paper-based systems (Table 5.2). The New Zealand customs service envisages processing electronic data interchange (EDI) import entries within a half hour and paper-based entries within 24 hours (WTO TPR, 2003). In Chile, the average customs clearance time was 2.2 hours (maximum three hours) for EDI processing, and 10.8 hours for the paper-based system (WTO CTG, 1998). The Philippines' project for computerising the tax and customs administrations during 1994-99 also resulted in considerably reduced customs clearance time for EDI users compared to non-EDI users in the first quarter of 2002 (Arevalo, 2002). In Thailand, it takes less than an hour on average for EDI systems but 3-4 hours for non-EDI processing (WTO TPR, 2003).

Table 5.2. Customs clearance time in automated and non-automated environments

Country	Customs clearance time (hours)		Conditions	Sources
	Automation	Non-automation		
Chile	2.2	10.8	On average	WTO CTG (1998)
New Zealand	0.5	24	At maximum	WTO TPR (2003)
Philippines	0.1-0.5	1.0-2.5	No inspection	Arevalo (2002)
	1.1-24.5	2.1-24.2	Documentary inspection	
	4.1-48.5	6.1-72.5	Physical inspection	
Thailand	1	3-4	On average	WTO TPR (2003)

Chile's implementation of an EDI system brought significant benefits to the trading community (WTO, 2000). For example, the number of data inputting errors fell from 14% to 2%. Traders were also allowed to resubmit import declarations containing errors on the same day instead of the following day. The opening hours for submitting declarations were greatly extended, customs clearance time was drastically reduced, and a number of officials were reassigned from repetitive administrative work to more value-adding duties such as customs inspection.

Border waiting time may be reduced through the introduction of automation to other border procedures, in particular by establishing a single-window system (see below). For example, it has been estimated that extended use of automated systems has made it possible to shorten the delay from port entry to release for food or like products imported to Japan by 47% (JETRO, 2002). In Korea, a single-window system linking automated systems of customs and 56 other government agencies has reduced the waiting time by half in government border procedures for goods subject to clearance confirmation for public health, social security and environmental protection (WTO TPR, 2000).

Reducing delays at the border can provide substantial benefits to traders. Hummels (2001) estimates that one day saved at the border equals a 0.5% reduction in tariffs. Another quantitative study on benefits of trade facilitation also suggested that welfare gains would be higher for trade facilitation measures that reduce delays at the border than those that reducing compliance costs related to border procedures (see Chapter 1).

Do investments in customs automation pay off?

There is a significant opportunity cost to foregoing the efficiency gains provided by automation and its trade facilitation effects (WTO CTG, 2000). Experience has shown that development and implementation costs can be covered by the financial benefits incurred in the long run, as World Bank project appraisal reports have shown (World Bank, 2000).

The cost-benefit assessment for the United States' Automated Commercial Environment (ACE), a new automated customs system, estimated that the government's USD 1 billion investment would save USD 22.2 billion for businesses and USD 4.4 billion for the US Customs Service over 20 years (USTR, 2002; APEC, 2003). In Chile, the total cost for implementing customs automation was USD 5 million, two-thirds of which was paid by the private sector; the costs to business were quickly recouped through business savings estimated at over USD 1 million a month (WTO CTG, 2000). The direct cost of developing Singapore's TradeNet, often cited as a successful effort to meet the peculiar needs of its free port environment, exceeded SGD 20 million (equivalent to about USD 11 million) in 1987, and saved Singapore traders around USD 1 billion a year in internal productivity savings (see Box 5.5; DFAT, 2001).

Box 5.5. Singapore TradeNet: Costs and benefits

Costs to the administration: The direct capital cost of TradeNet's development, *i.e.* the contract cost to IBM and other subcontractors, was over SGD 20 million in 1987. This does not include the costs incurred by various agencies in conceiving the project, developing requirements and specifications, and establishing Singapore Network Service Ltd. (SNS), the quasi-governmental company that manages TradeNet.

Costs to businesses: In order to join TradeNet, a company has to pay a one-time connection fee of SGD 750, a monthly charge of SGD 30 for a dial-up port and transaction costs of SGD 0.50 per kilobyte of transmitted information (the average declaration requires 0.7 kilobytes). A company also needs the appropriate hardware for local processing of applications and transmission of the coded EDIFACT data. When TradeNet was introduced, the minimum PC configuration required cost SGD 4 000 plus software costing between SGD 1 000 and SGD 4 000. The indirect cost of making the changes to procedures and protocols necessary to adopt TradeNet was less clear. For some companies, the conversion was minimal because they already possessed the relevant systems, but for those with no prior experience in e-business, the change was more difficult. Today, the user pays a one-time fixed fee of about SGD 1 500 and a yearly maintenance fee of about SGD 1 200. In addition, the user pays SGD 6.50 per transaction or declaration made through the system.

Benefits to businesses: TradeNet has resulted in considerable productivity improvements and the entire trading community has become more competitive internationally. Turnaround time for processing typical trade documents was reduced from two to four days to as little as 15 minutes. Studies suggest that TradeNet reduced trade documentation processing costs by 20% or more by replacing more than 20 paper forms by a single on-line form. The use of clerks or couriers to transport trade documents to various agencies and the long delays while staff waited for documents to be cleared were eliminated; time was saved and staff and vehicles could be deployed more efficiently. Faster turnaround made it possible to better organise shipments and overall production activities. Several freight forwarders reported savings of 25-35% in handling trade documentation as TradeNet operates 24 hours a day rather than simply during normal office hours.

Benefits to the administration: Benefits also accrued to government agencies using the system. Customs moved from a system of post-approval to pre-approval of applications, such that customs duties are now pre-paid electronically and customs receives payments faster. TradeNet also enabled faster compilation of more accurate and complete external trade statistics, since data from the documents no longer need to be rekeyed by government agencies to compile trade statistics. Singapore claims that properly applied trade facilitation is already saving it in excess of 1% of its GDP each year.

Source: Extracts from ESCAP, *Trade Facilitation Handbook for the Greater Mekong Subregion*, Chapter 7: Electronic Trade Document System Development, February 2003.

Lessons learned

Many studies and reports have drawn lessons from customs reform and modernisation projects (Cox and Ghoneim, 1998; Wilson, 2001; WCO, 2002; World Bank, 2005). A successful outcome generally depends on high-level commitment, a top-down and holistic approach, consultations with businesses, the establishment of a consultation committee and clear responsibilities.

Automation is not a panacea

In spite of its great potential for increasing customs efficiency, automation should not be viewed as a panacea for achieving the benefits of trade facilitation (WTO CTG, 1999). Too often, there is a misperception that automation can solve all the problems faced by customs, such as fraud, poor revenue collection and corruption, and that it therefore should be implemented straight away.

Experience has shown that this is not the case. Rather, to achieve its full potential, customs automation should be accompanied by streamlined and simplified border practices and management. The introduction of new or updated automation systems for border procedures is an important opportunity for revisiting and re-engineering overall border procedures.

Long-term commitment is crucial

In addition to initial development and implementation costs, automation generates operating and updating costs. For example, the Philippines' automated customs system suffered badly from the withdrawal of the external funding needed for continuous system updates. Sustainability of funding and management is essential to keep automated systems operational and functional. Also, as the frequent updates of protocols and/or procedures may be a considerable burden for both businesses and governments, the timing of changes should be carefully considered to strike a balance between costs and benefits.

Emerging trends

This section aims to identify some emerging trends from ongoing and recently implemented automation programmes. It may be useful from a capacity-building perspective since newcomers to automation have the advantage of being able to adopt approaches based on best practices and modern technology. The findings presented here can be considered as a menu of options or actions, depending on the degree of a country's

development, with respect to the introduction, updating or changing of automated systems.

Before examining specific trends in automation, it is worth noting the lead time necessary for implementing new or changed systems and the related cost implications. In fact, it normally takes several years to develop and implement a new system. For example, the phase-by-phase implementation of the ASYCUDA system takes about three years (Gurunlian, 2001). In Japan, the automated customs systems for air cargo and sea cargo were updated in 2001 and 1999 respectively, after the end of their eight-year life cycle.

The necessary time frame for implementation appears associated with relevant international initiatives as well as national e-government strategies. Although the goal is non-binding, APEC envisages achieving paperless trading by 2005 for industrialised and 2010 for developing APEC economies. APEC has also set a goal, included in the Shanghai Accord, to reduce trade transactions costs by 5% across the APEC region by 2006. Moreover, harmonised electronic messages for certain border procedures are expected to be implemented in the G7 countries by 2005. National e-government strategies in many OECD countries also envisage handling all types of government procedures on line (Accenture, 2002).

Paperless environment

Recent legal and technical developments relating to ICT make it technically possible to eliminate paper requirements in government border procedures, but some paper documents are still required in most countries. This is often due to the legal requirement to submit original documents and/or the need of the signature of the person in charge. It may also be due to procedural requirements for verification purposes. Several countries allow electronic clearance without paper documents but require paper copies to be submitted at a later stage. Cost savings will be below potential for both businesses and governments unless paper document requirements are completely eliminated (DFAT, 2001). Even so, the reduction in delays due to paperless clearance can secure substantial benefits. According to WTO TPRs, the trade documents typically involved in importation include import entry declaration, official certificates and commercial documents.

Import entry declarations

Not only customs services but also many other government agencies are responsible for the movement of goods at the border: port authorities, statistics bureaus and various control agencies, including health and safety agencies. Among government border procedures, however, automated

systems for customs import entry declarations appear the most widely used in both OECD and non-OECD countries. First introduced in the 1970s in Europe, they are now common in most countries. Automated systems have increasingly been extended to other customs procedures as well as other border procedures such as quarantine-related or port procedures (APEC, 2002a). Since most have been developed independently to meet their particular requirements, interoperability of the systems seems to be unsatisfactory in most cases, as discussed above.

Many countries tend to maintain a hybrid system which allows government agencies to accept trade-related declarations in both electronic and paper form. In several countries, various incentives encourage traders to adopt electronic lodgement, such as lower fees and cheap or even free software. The e-customs project of the EU envisages electronic customs declarations as the norm and verbal or paper-based declarations as the exception (EC, 2002a). On the other hand, electronic lodgement is obligatory in some countries. In Korea, New Zealand, Morocco, Singapore and Peru, for example, import entry declarations must be electronically filed to customs authorities. In Mexico and Chile, fully electronic import declaration systems have been established and declarations must be processed by certified customs brokers. In the United States and Australia, an import customs cargo report must be electronically lodged, but the hybrid system for import entry declarations remains operational for the time being. This enables data to be systematically and efficiently processed for assessing the risk of border-crossing cargo. In any case, it is desirable to store and process the declared information electronically in order to enhance efficiency and allow secondary use within or between governments.

Official certificates

The importation of goods may require official certificates issued by different authorities. Such certificates may include SPS certificates and certificates of origin. For example, certificates of origin may be needed to enjoy preferential tariff treatment under the Generalised System of Preferences (GSP) or free trade agreements (FTAs).[8] They are normally issued by governments (*e.g.* the customs authority) or other authorised bodies (*e.g.* chamber of commerce) in the exporting country, and most importing customs authorities still require them in paper form, while increasingly accepting electronic equivalents for most other documents. In

8. Procedures to issue certificates of origin can vary across FTAs. Instead of official certificates, self-certification by traders is adopted in several FTAs, including NAFTA.

cases where certificates of origin are needed and in light of the recent proliferation of FTAs, the possibility of electronic submission of certificates of origin in standardised format is increasingly important. Electronic submission discharges customs officials to a certain degree from having to process paper certificates based on different sets of rules of origin.

Among trade-related documents, certificates issued by foreign authorities appear the most difficult to incorporate into an electronic environment because interoperability between the systems of the issuing and accepting authorities may be necessary. A limited number of interoperable systems are found in bilateral arrangements or regional initiatives. The Australian Quarantine and Inspection Service forwards to the Japanese Ministries of Health and Welfare and Agriculture, Forestry and Fisheries 38 000 electronic health certificates a year for meat exports to Japan (DFAT, 2001). APEC has endorsed the Pathfinders Initiatives in the area of electronic SPS certificates and electronic certificates of origin,[9] with the aim that each APEC economy will implement them when they are ready. As of early 2004, Australia, New Zealand and Chinese Taipei participated in the former initiative, and Singapore and Chinese Taipei participated in the latter (APEC, 2004). The APEC Secretariat will review progress in due course in order to encourage broader participation of APEC economies.

Commercial documents

Border agencies often require various kinds of commercial documents to support import entry declarations. This is mainly to verify the information declared by traders and it often involves duplication. If governments do not remove such regulatory requirements altogether, they should consider accepting electronic equivalents in order to fully realise the benefits of the paperless environment.

According to the WTO TPRs (2000-05), standard commercial documents required for border procedures include commercial invoice, manifest, bill of lading and packing list. In commercial transactions, electronic equivalents to such commercially available documents are more and more common and, in particular, they are widely accepted throughout the banking and logistics sectors. Private value-added networks (VANs) such as Bolero and TEDI (Trade EDI) provide frameworks for electronic documentation and formats for various kinds of trade documents. Border

9. It was estimated that the application and transmission of electronic certificates of origin to buyers, banks and the relevant regulatory agencies would reduce the entire process from four to seven days to just a few minutes via the Internet, with direct savings of about SGD 2.9 million a year for Singapore traders (APEC, 2002b).

authorities are increasingly required to consider acceptance or interoperability of such electronic equivalents.

In Korea, all documents required for customs import entry declarations must be submitted in electronic form except for certificates of origin. Commercial invoices are no longer required; the relevant information is incorporated in the customs import entry declaration (CTB, 2001a). The NAFTA Implementation Act allows the US customs authorities to release entries without a review of invoices by a customs officer. Instead, commercial invoice information needs only to be transmitted when specifically requested by customs. This "Invoice by Request" feature is available within the electronic invoice programme prototype, and the electronic invoice is reportedly requested for a very small number of shipments. The Japanese customs authorities began accepting electronic invoices via the Internet from March 2003, and they are currently reviewing the interoperability between Japan's customs system and private VANs (MOF, 2002). The Japan-Singapore Economic Partnership Agreement (JSEPA)[10] also includes a provision for jointly reviewing progress to accept, as supporting documents, electronic trade-related information and electronic versions of relevant documents exchanged between the public and private sectors. This is meant to help promote paperless trading.

Internet use

The Internet is increasingly used as a tool for communicating between traders and government authorities. The most widespread use of the Internet is probably for making trade-related information available to the public and may provide an easily accessible centre for all kinds of trade-related information.[11] Moreover, governments increasingly offer the possibility to submit electronically via the Internet import entry declarations and other relevant documents required in border procedures. Businesses generally welcome the use of the Internet for modernising customs procedures and emphasise its advantages, such as the ability to access shipment information quickly, securely and from any location (ICC, 2002).

Some OECD and non-OECD countries have either partly or fully implemented such a system for customs declarations, while several others are in the process of doing so. Hong Kong (China), Japan, Korea,

10. For further information on JSEPA, see www.mofa.go.jp/region/asia-paci/singapore/jsepa.html.

11. As of 6 July 2005, 134 out of 166 members of the WCO provide hyperlinks to their homepages on the "customs web sites" at www.wcoomd.org/ie/en/CustomsWebSites/customswebsites.html.

New Zealand, the Philippines, Singapore, Sweden and Thailand are some examples. In several European countries like the United Kingdom and Germany, private VANs act as clearing houses for receiving trade data from traders via the Internet and forwarding them to the relevant government system through closed networks. Also, UNCTAD has launched a Web-based version of ASYCUDA, called AsycudaWorld, which is compatible with the latest EDI-based ASYCUDA ++ (UNCTAD, 2002a).

An interesting possibility is the use of mobile phones for Internet connection. In the Philippines, Internet access through mobile phones allows traders to pay duties as well as access trade-related information (ASEM, 2002a). In Sweden too, trade-related information can be accessed via mobile phones (Swedish Customs, 2002). In a pilot project in Japan, truck drivers can use mobile phones to check the status of customs clearance and whether and when to move their containers to or from the container yard in the port.[12]

Benefits of Internet use have been well documented in the context of e-commerce and e-government. For instance, the installation of Web-based systems normally costs much less than conventional EDI systems, since it does not require a specific type of hardware and software, and the same infrastructure can be used for both business and official purposes. Web-based systems are of particular interest to SMEs in developing countries which suffer from a number of drawbacks, such as their distance from important markets and the lack of information about market opportunities and available supplies. However, developing countries are less in a position to avail themselves of Internet services than developed countries owing to their physical and financial constraints. They may need first to invest in basic infrastructure for telecommunication and power supply. Such investments are usually substantial but the services they generate can be shared and benefit the society as a whole.

Experience to date indicates that Internet communication is unlikely to be adopted for all government border procedures. It is likely that conventional electronic means of communication will be retained for the time being, including closed EDI systems based on in-house direct connection or via relevant agencies, through input at a designated centre, or submitted on floppy disks. Traders are able to select the most suitable means of communicating with government authorities. Since Internet-based solutions are often currently considered more vulnerable for heavy traffic, direct permanent EDI-based connections to the relevant authorities may be suitable for regular and high-volume traders. Low-volume traders may

12. www.hits-h.com/.

prefer the Internet. For example, New Zealand Customs Service (2004) suggests that Internet declarations are generally more suitable for low-volume traders, because they do not need to invest in special software but simply pay for message costs. If compatibility among communication means is assured, such multi-tiered systems are likely to be adopted elsewhere, although it is generally more expensive for governments to maintain multiple systems.

Single-window environment

A "single window" can be described as a system that allows traders to lodge information with a single body to fulfil all trade-related regulatory requirements (UNECE, 2002). It can provide one entrance for all data and documents related to the release and clearance of an international transaction. The concept of single-window environments, whether physical or electronic, has existed for several decades and has been recommended for a long time.[13] However, implementation has been slow in many countries. This is partly due to competition between government agencies and legacy systems that make interoperability difficult. Agencies are often reluctant to change their current automated system for the sake of interoperability. In spite of this, an increasing number of electronic single windows are now in operation, including in Australia, the Czech Republic, Finland, Japan, Mauritius, the Netherlands, Norway, Sweden, Singapore, Thailand, the United Kingdom and the United States.

Electronic single-window systems can be established in different ways (UNECE, 2002). One is to allow one agency, such as customs services, to perform a number of tasks on behalf of other government agencies. Such a system is used in the Netherlands and Sweden. In Sweden, "virtual customs" are in charge of selected trade-related procedures via the Internet (Swedish Customs, 2002). Another is an entry through which traders are able to communicate with different systems of different government agencies, as in Singapore and Mauritius. A third is a single integrated system which allows traders to submit the standardised data only once; the system distributes the data to the relevant agencies. Current automated systems in Japan and the United States fall into this category. Japan's system was installed in July 2003, and as of the beginning of 2004 it is reported to handle close to a quarter of customs clearances (OECD, 2004). In addition, private VANs may provide a single-window function as intermediaries and value-added services by receiving the necessary information for border procedures from traders and distributing it to the

13. ICAO, CICA, Annex 9 (4.24) Recommended Practice (UN, 2001).

relevant government authorities in appropriate form, as in several European countries.

Co-operation and co-ordination among the relevant government agencies are essential for successful single-window environments. With a single-window system, different procedures can be processed in parallel, thereby reducing delays. Also, traders do not need to keep different systems or produce data in different formats for different border procedures. Another possible benefit to governments is the possibility of carrying out risk analysis by sharing information among relevant government agencies, so as to enhance the overall efficiency of government. In this case, it may be necessary to overcome problems relating to confidentiality, as authorities may be prohibited from forwarding information declared by traders to other agencies. A UN/CEFACT recommendation on establishing a single-window system and associated guidelines, which are currently under discussion, may provide a good reference for planning and establishing single-window environments (UN/CEFACT, 2004).

Harmonisation/standardisation

Another development is the progress made in the harmonisation or standardisation of electronic message structures and data elements. UN/EDIFACT (United Nations Directories for Electronic Data Interchange for Administration, Commerce and Transport)[14] provides a set of international standards in this area. These standards are used by the G7 countries, which have harmonised and standardised their customs message structures and data requirements. In January 2002, this initiative was taken over by the WCO for implementation and follow-up work and renamed "WCO Customs Data Model".[15] UNECE has elaborated an integrated set of electronic standards-based trade documents to be implemented on a pilot basis in selected countries (UNECE, 2004).

A number of international initiatives to align their border procedures, including customs procedures, with internationally standardised or harmonised systems have also been taken by members of regional trade agreements. In APEC, for example, collective action plans (CAPs) in the area of customs procedures provide for the adoption and support of the UN/EDIFACT standard as well as the harmonisation of common data elements based on the WCO work for customs cargo clearance (APEC, 2002c). Similar endeavours are part of the ASEM Trade Facilitation Action Plan for 2002/04 (ASEM, 2002b). The EU-Mercosur Action Plan on

14. www.unece.org/trade/untdid/welcome.htm.

15. www.wcoomd.org/ie/En/Topics_Issues/FacilitationCustomsProcedures/.

Business Facilitation agreed in May 2002 includes "an undertaking to use and further develop information technology, using international standards" (EC, 2002b), and the Positive Economic Agenda agreed in the EU-US Summit in 2002 includes an electronic customs initiative for defining and developing prototypes between the EU and the United States (EC, 2002c).

The EU has also undertaken community-wide efforts to harmonise members' automated systems in its "Customs 2007" programme (EC, 2003b),[16] including the New Computerised Transit System (NCTS). The main elements of the NCTS are: to confirm the legal status of electronic exchanges between economic operators and customs as well as between the various customs administrations; to provide rules on the structure and content of messages to be exchanged as well as the codes to be used; and to establish a procedure for providing systematic advance notification to concerned customs through electronic exchange of data between member customs administrations. This covers transit procedures undertaken on the basis of single administrative document (SAD) declarations and therefore mainly concerns road transport at present (although it is applicable to other modes of transport). The programme also includes an objective to support the creation of e-customs via the development of communication systems coupled with the necessary legislative and administrative changes (EC, 2002d).

Harmonisation or standardisation of data requirements is essential for taking full advantage of electronic documentation. This can take place between the relevant automated systems in the public and private sectors, among government agencies, and between agencies in importing and exporting countries. It would enhance transparency of border procedures by eliminating data ambiguities and allow traders to find easily information on the type and format of data required. Harmonisation or standardisation would also allow traders to use the same information for commercial documents, export and import documents, and for statistical and trade regulation purposes. They would not have to re-enter or modify data for each instance, and opportunities for errors in electronic documentation would be greatly reduced. This would pave the way for a "seamless data flow" throughout trade-related activities.[17] As a result, traders could avoid the burden of complying with different requirements of different

16. http://europa.eu.int/comm/taxation_customs/customs/c2007/customs_2007_0_en.htm.

17. In the WCO Customs Data Model, export and import data requirements are aligned and the respective electronic declarations share the same structure. This allows traders to exchange information more economically and enables the importer to utilise the export information as the basis for the import formalities.

authorities. International shipping lines calling at multiple ports are often faced with this problem (APEC, 2002a).

Additional observations

The emerging trends summarised above lend themselves to several cross-cutting observations. One is that traders are provided multiple choices for communicating with the relevant government authorities, including paper-based systems, inputs at a designated centre, physical submissions on floppy disks, closed EDI systems, trade-related private agencies such as customs brokers, open network Internet systems, private or quasi-governmental VANs, direct permanent connection to the related authorities, or varying combinations of the above. Traders can choose the most suitable means of communicating with government authorities depending on their situation. On the other hand, it is worthwhile noting that electronic lodgement has become mandatory in several cases, and more countries are expected to follow, particularly in light of increasing national security concerns about the movement of cargo.

Another observation is the importance of interoperability among information exchange systems to ensure the efficiency of border procedures. Co-operation and co-ordination are essential between the public and private sectors, among border agencies, and between authorities in importing and exporting countries. For example, the implementation of electronic single-window systems requires interoperability between government systems as well as co-ordination between the private and public sectors. Risk management is also facilitated if the authorities in importing and exporting countries have interoperable information systems.

Conclusions

The negotiation of WTO disciplines on trade facilitation is of concern to some developing countries. Their concerns relate to the prospective costs of compliance and the capacity constraints of implementing additional disciplines.

Among trade facilitation measures, customs automation has attracted considerable attention owing to its potential for reducing trade transaction costs. In particular, it is considered one of the most promising ways to facilitate trade while safeguarding national and social security. Yet the cost of automation may be significantly greater than other trade facilitation measures, even though it varies depending on the initial state of customs infrastructure and customs procedures and the ambitiousness of the reform.

In some cases, automation takes up two-thirds of the budget for customs-related lending projects.

Customs modernisation programmes may require commitments to large initial investments and long-term operating and maintenance costs. Yet experience has shown that the costs can be quickly recouped by the gains from facilitated trade and increased productivity in customs administrations. The non-application of automation can also entail a high opportunity cost.

Automation should not be considered a panacea for achieving the benefits of trade facilitation. Rather, real benefits can be achieved only if automation is accompanied by measures to streamline and simplify border procedures. In addition, long-term financial and political commitment must be provided to maintain automated systems, particularly in low-income and medium-income countries.

Trends in recently introduced automation include paperless environments, Internet use, single-window systems, and harmonisation/standardisation. Multi-tier means of communication and interoperability between different automated systems are also of great importance.

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Acronyms and Abbreviations

ABAC	APEC Business Advisory Council
ACE	Automated Commercial Environment
ADB	Asian Development Bank
AFIP	Federal Administration of Public Revenue (Argentina)
APEC	Asia Pacific Economic Cooperation
APFC	Asia Pacific Foundation of Canada
ASEM	Asia-Europe Meeting
ASYCUDA	Automated System for Customs Data Processing
BDV	Brussels Definition of Value
BSCC	Baltic Sea Customs Conference
CAP	Collective Action Plan
CASE	Customs Automation Services (Jamaica)
CBR	Central Board of Revenue
CCRA	Canada Customs and Revenue Agency
CEMP	Customs Expansion and Modernisation Programme
CGE	Computable general equilibrium
CIS	Commonwealth of Independent States
CRMS	Customs Risk Management System
CTB	Customs and Tariff Bureau
CTG	Council for Trade in Goods (WTO)
DDA	Doha Development Agenda
DFAT	Department of Foreign Affairs and Trade
DFID	Department for International Development (UK, ex ODA)
DI	Destination Inspection
DTRE	Duty and Tax Remission for Exporters

EC	European Commission
EDI	Electronic Data Interchange
ESCAP	Economic and Social Commission for Asia and the Pacific
EU	European Union
FAST	Flexible Anti-Smuggling Team
FDI	Foreign Direct Investment
FoB	Free On Board
FTA	Free Trade Agreement
G7	Group of Seven
GAINDE	Gestion automatisée de l'information douanière et économique)
GATT	General Agreement on Tariffs and Trade
GoP	Government of Pakistan
GSP	Generalised System of Preferences
GTAP	Global Trade Analysis Project
HS	Harmonized System
IADB	Inter-American Development Bank
IAP	Individual Action Plan
ICC	International Chamber of Commerce
ICT	Information and Communication Technology
IDA	International Development Association (World Bank)
IMF	International Monetary Fund
IOC	Input Output Co-Efficient
IOCO	Input Output Co-efficient Organisation
ISIDORA	Internet-Integrated System For Customs Operations and Regulations (Chile)
IT	Information Technology
JETRO	Japan External Trade Organization
JICA	Japan International Co-operation Agency
JSEPA	Japan-Singapore Economic Partnership Agreement
LAC	Latin American and Caribbean countries

LDC	Least Developed Countries
MIS	Management Information System
MOF	Ministry of Finance
MoFP	Ministry of Finance and Planning (Mozambique)
NAFTA	North American Free Trade Agreement
NCTS	New Computerised Transit System (EU)
NGTF	Negotiating Group on Trade Facilitation (WTO)
ODA	Overseas Development Administration (UK, now DFID)
PAT	Port Authority of Thailand
PRINCE	Project Management in Controlled Environments
PSI	Pre-Shipment Inspection
SAD	Single Administrative Declaration
SBE	Single Bill of Entry
SIM	*Sistema Informático María*
SIU	Staff Irregularities Unit
SME	Small and Medium-Sized Enterprise
SOFI	Computer System for International Freight *(Système d'ordinateurs pour le fret international)*
SPS	Sanitary and Phytosanitary
SRC	Survey and Rebate Cell
TEDI	Trade Electronic Data Interchange
TEPI	Trade, Export Promotion and Industry Initiative
TIMS	Trade Information Management System
TPR	Trade Policy Review
TTCs	Trade Transaction Costs
UMA	Angolan Technical Unit for Customs Modernisation
UN	United Nations
UN/CEFACT	United Nations Centre for Trade Facilitation and Electronic Business
UN/EDIFACT	UN Directories for Electronic Data Interchange for Administration, Commerce and Transport

UNCTAD	United Nations Conference on Trade and Development
UNECE	United Nations Economic Commission for Europe
URA	Uganda Revenue Authority
USTR	United States Trade Representative
UTRA	Mozambique Customs Rehabilitation Unit
VAN	Value-Added Network
VAT	Value-Added Tax
WCO	World Customs Organization
WTO	World Trade Organization

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