II. TRADE FACILITATION, INFORMATION TECHNOLOGY AND DEVELOPMENT IMPACT: FRAMEWORK AND EXPERIENCE

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Introduction

It is important to lay out a framework for understanding how trade facilitation (TF) affects the movement of goods, and where information technology (IT) fits in. This relationship, in turn, sets the stage for locating small and medium-sized enterprises (SMEs) in international transactions. There is an increasing amount of substantial literature on TF and equally wide knowledge of IT. While it is not the intent of this chapter to survey these materials, to the extent that they are relevant to the following discussion, they will be referred to appropriately.

Section A elaborates on TF and the wide range of instruments that have been used and analysed while section B details some actual experiences in the use of IT in TF. Section C examines small and medium-sized enterprises and IT in TF. Section D summarizes this chapter and considers the implications for inclusive growth.

A. Framework and empirical evidence

Identification of the channels and mechanisms by which trade barriers other than transparent tariffs, when removed or reduced, affect commercial transactions – levels, composition and speed – and overall economic conditions is at the core of the framework needed to understand the development impact of the use of IT in TF. The removal or reduction of these barriers and the associated measures that both the public and private sectors apply are within the scope of TF, although there may then be a need to delineate the instruments that include the use of IT. How IT comes into TF, to the extent that it is not an integral part of it, also becomes part of this framework.

In an Asia-Pacific Economic Cooperation (APEC) (2002) study, TF was not directly associated with the use of IT. Rather, the study noted, TF was considered to comprise activities in the movement of goods across borders that "... lower the costs of administration, standardization, technology, information, transaction, labour, communication, insurance and financing as well as reduce time costs related to these procedures. The technology costs are involved during standards procedures, and information costs arise while importing or exporting goods and services. These costs result in loss of economic efficiency and reduce gains from trade...". What matters here are those actions by economic agents that lower these costs. Instead of considering various options for carrying out TF, the study measured the effects of these TF activities on macroeconomic and trade variables.

On the other hand, the study by the Organisation for Economic Co-operation and Development (2005) on the role of automation in TF analysed the effects of automating TF measures, many of which are customs-related. Indeed, the major focus of the study was

on examining the impacts of automating the entire customs procedures related to imports and exports. The study surveyed the range of benefits and costs associated with such automation. Although automation is not seen as a "panacea" for TF, it improves the movement of goods across borders. A paperless environment, the increased use of the Internet and a legal framework that allows digital transactions all suggest that an automated TF increases the efficiency of commercial transactions.

There are at least two forms of thinking on TF and how IT fits into the scheme of things. One is simply to analyse how non-tariff barriers to trade affect international transactions on the trading countries. Such a framework identifies those barriers and then traces the effects of removing them, either in total or as specific components depending on the array of those components. The task of their reduction or removal comes within the purview of trade facilitation, given that they are often non-tariff in nature. This line of thought refrains from laying out how the TF measures are to be undertaken and implemented. Thus, IT does not enter into the framework in concrete ways and is often left as part of the TF agenda. IT may only be one means of addressing the reduction of these barriers.

Another view is simply to analyse what happens to trade and the economy in a scenario where pervasive barriers are dominated by bureaucratic formalities, documentary requirements and the involvement of multiple public and private agencies, and the ensuing scenario where these barriers are removed through automation of processes and procedures. The presumption is that these processes and procedures act as bottlenecks to the movement of goods across borders. Automation is the trade facilitation measure applied and its impact is in the speedier flow of goods.

It would appear that if there are differences in the underlying framework between these two lines of thought they may be subtle, not striking. Yet, when we go into some of their details in terms of the scope of TF, methodology for measuring TF, and implications for addressing and using IT, the differences may turn out to be more prominent.

1. Trade barriers and measures, and empirical analyses

In the first place, the barriers that are identified and for which TF measures are applied vary considerably. These could be "non-price" wedges between domestic and world prices including non-tariff measures (conventionally viewed as policy driven such as licences and quotas), transportation bottlenecks, logistics constraints, infrastructure deficiencies and administrative weaknesses.

The innovative ways in which these have been further indicated or quantified have grown in recent years. In the APEC (2002) study, trade costs incorporate transactions costs (transport and insurance), policy costs (tariff and non-tariff barriers) and facilitation costs (absence of trade facilitation). A reduction in any of the components can be considered as equivalent to a reduction in trade costs. While it is theoretically possible to measure the incremental welfare effects of TF (depending on the parameters of import demand and change in trade costs), the usual empirical basis for measuring barriers has used results from surveys of firms about their magnitude. In Arvis and others (2007), for

example, TF practitioners rated a range of measures of logistics performance on a given scale. These various ways of quantifying the costs of TF have revealed such measures as trade costs of non-tariff barriers as a share of total trade values, technology standards imposing 10 per cent of production costs, the equivalence of health restrictions to tariffs, costs of transport restrictions to border crossings as share of total transport time, a monopoly in port services in terms of export taxes etc.

The results from surveys of business firms appear to indicate the relative importance of different trade impediments, which can then be measured against trade costs. In the APEC (2002) study, the results reveal that high tariffs, complex customs and administration procedures, trade restrictions and quotas, business mobility, standards and licences rank in decreasing importance (as barriers) to international commerce. Further breakdown of these categories provides finer specifications of the impediments. However, a consolidated measure of costs is in terms of effects on transactions costs, prices of imported products and increases in consumer demand by trade facilitation. These variables are then used to estimate their influence on the broader macroeconomic indicators such as aggregate output, employment, wages, inflation, trade volumes and other trade-related indicators. Their numerical impacts indicate how much they impinge on the economy in general and on the trade sector in particular. In addition, since the variables are only outcomes of more specific actions, they do not point to direct TF measures.

Consider now what happens if we translate into specific variables the finding (from surveys) that complex customs procedures and trade administration are the main impediments to faster trade flows. A common direction followed is a “time and motion” study of the customs procedures and trade administration. By breaking down the entire procedure into component parts that are attributable to various administrative responsibilities, it is possible to measure the impacts of addressing individual components on the speed of trade movements. The increments can then be estimated in terms of trade values, volumes and eventual effects on the economy.

In the second place, the way these barriers are modelled in determining how TF measures would affect the trading economies equally varies. Some studies note that empirical analyses of TF employ an array of methods such as surveys (e.g., how important barriers are to traders), gravity models (examining the importance of geography in explaining the existence of barriers), partial equilibrium analyses and general equilibrium modelling.

Many of these models have been used to analyse the economic benefits of TF. In a review of these models by APEC (2002), partial equilibrium analyses focused on estimates of the equivalence of trade restrictions to tariffs on consumer welfare gains and in terms of gross domestic product (GDP) effects, and the effects of standards and conformance in terms of trade costs (value of trade). Surveys obviously focused on the nuts-and-bolts of TF – time costs for freight loading, transactions costs and compliance costs of standards. Regression estimates revealed how much trade creation took place, and the volume and value increases resulting, for example, from standardization. The larger computable general equilibrium (CGE) models yielded estimates of increases in real incomes from tariff reductions and TF measures. The inclusion of wider barriers to trade

through infrastructure bottlenecks, logistics (domestic and international) networks, clearance processes by customs and other agencies, facilities to track and trace shipments etc. has used ratings by TF professionals regarding performance in individual countries (Arvis and others, 2007). These ratings can be used to trace their effects on larger macroeconomic variables (e.g., impacts on trade and poverty).

Overall, in the context of this study, existing analytical frameworks of trade facilitation are characterized by, on the one hand, the use of aggregate macroeconomic indicators, trade impediments often indexed by surrogate variables, and models and methodologies that do not fully take into account automation and other IT instruments; and on the other hand, by the use of comparative indicators (usually from time-release studies) of trade transaction efficiency before and after the institution of automation and other IT applications. Changes in the comparative indicators are attributed to IT use as the principal TF measure, although other related measures may also be included in the analyses. The mechanisms by which TF affects trade, aggregate output and income are similar, although the ways in which they are arrived at may differ. For example, changes in freight loading/unloading times can be translated into increases in the volume of trade and other aggregate economic indicators while impacts on trade volumes can be translated into increased movement of goods across borders (loading/unloading times). Indeed, they are mirrors of each other.

2. GATT framework and empirical analyses

The underlying context of the TF framework laid out so far is the broad economic changes that take place when non-tariff (and even more broadly, “behind-the-border” and “inside-the-border”) impediments to trade are removed or reduced. It takes into account many interacting variables economy-wide. However, a narrower context for TF has also evolved, defined by parameters in which new trade rules governing TF will eventually emerge. These relate to the GATT 1994 Articles V (Freedom of Transit), VIII (Fees and Formalities Connected with Imports and Exports), and X (Publication and Administration of Trade Regulations).

In the analytical exercises related to the framework, the success of TF measures is usually indicated by a fall in the price of imports, which would be tantamount to improvements in activities related to the three GATT Articles. In a partial equilibrium setting it is then possible to estimate the effects of price reduction (in equivalent terms to some TF initiatives) on trade and the larger macroeconomy. Also, in the CGE modelling the effects can be traced of the TF surrogates on specific sectors of the economy, various components of demand and other aggregates.

Wilson, Mann and Otsuki (2004) attempted to combine the ratings of various impediments found in many surveys with more objective data on trade flows, tariff structure and traditional explanatory variables of trade on cross-country experiences covering 75 countries. Four indicators of TF were constructed and used – standardized ratings on port efficiency, customs environment, regulatory environment and service infrastructure. They argued that these indicators reflected the TF agenda of Articles V (port efficiency), VIII (customs environment), and X (regulatory environment) in addition to also indicating

"border" measures (port efficiency and customs environment) and "behind-the-border" measures (service infrastructure and regulatory environment).

The Wilson, Mann and Otsuki study results showing the importance of TF measures in expanding trade appear to be consistent with limited country-level data. Indeed, what those results suggest is that unilateral TF reforms and implementation would lead to gains, especially in terms of exports. The types of reforms needed by each of the categories of TF cannot be answered by the study but by a complementary framework that deals with the actual "nuts and bolts" in the movement of goods across borders.

The Wilson, Mann and Otsuki study illustrated a combination of the two streams out of the TF framework. The further specification of the border trade impediments into their components highlighted varying results. In addition, as they indicated, the literature that uses aggregative data tends to show large TF impacts simply because they generally incorporate many of the particular activities involved in reducing trade barriers, both at the border and behind the border. They generally find high TF elasticities of trade.[1] This is also validated in some of the CGE models used in evaluating the impacts of TF on the aggregate economy.

The APEC (2002) study estimated that the increase in GDP arising from TF (which is presumed to be reflected by a 5 per cent reduction in trade costs over five years across all the economies) would be unevenly distributed, with Singapore recording the largest gain and the United States the smallest gain.[2] In the recent CGE simulation (Trade Sustainability Impact Assessment) of the proposed ASEAN-European Union Free Trade Area the results are similar – large output gains for some countries, small for others. In terms of export (value) increases, the underlying TF elasticities are quite high across different TF configurations (proxied by a 1 per cent reduction in border costs for limited FTA, and a 2 per cent cost reduction plus 1 per cent cost reduction in some sectors for ambitious-plus FTA) analogous to the impacts on aggregate outputs (ECORYS, 2009).

It is also possible to observe the effects of a singular trade-facilitating measure on the economies of trading partners. Examples of such a singular measure include port development, transport infrastructure, logistics support and IT installation.[3] In actual experience, a singular measure is often implemented as part of a larger package, especially if time horizons differ. The study by Warr, Menon and Yusuf (draft manuscript 2009) applied general equilibrium modeling to evaluate the aggregate effects of the second Mekong bridge between the Lao People's Democratic Republic and Thailand – providing a new trade link that is directly connected with the road infrastructure of the East-West

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1 The highest elasticity comes from improved port efficiency compared with the elasticity of improved customs environment or services sector infrastructure. Note that port efficiency uses port facilities, inland waterways and airports.

2 The 5 per cent reduction in trade costs is the trade facilitation target of the APEC economies.

3 Some of these singular measures, including standards harmonization, tariff-reduction equivalence of saved shipping time, increased web hosts and trade flows, and reductions in bilateral telephone call prices and bilateral trade flows, were reviewed in Wilson, Mann and Otsuki, 2004.

Economic Corridor of the Greater Mekong Subregion – on trade together with other effects. The model used in the study simulated the effects of different magnitudes of reduction in transport costs between the two border provinces arising from the use of the bridge.

Initial results for the long term indicate large gains in trade not only between the two countries but even larger gains in terms of each country's trade (exports) to the rest of the world. The responses vary by commodity but in general it appears that there is greater gain on the part of the Lao People's Democratic Republic from the transport infrastructure facility than on the part of Thailand. These results however can not be truly attributable to the infrastructure alone since the presumption is that cross-border facilities have equally been provided. This result was apparently confirmed when the bridge became operational and the associated TF measures such as customs improvements (e.g., one-stop inspection and electronic submission of declarations on the part of Thailand) were implemented.

This review of various ways of looking at trade facilitation suggests some common framework in which changes take place. There are obviously direct behavioural changes on the part of economic agents along the chain from the moment goods arrive at the ports until they are delivered to final destinations as well as indirectly on the broader surrounding economy. A range of methodologies are applied in measuring the effects of TF and, depending on the variable specification, these changes result from particular measures. TF can also be seen as specific intervention modalities that can be considered as projects for which ex ante benefits can be identified and quantified. When combined with quantification of costs, it is possible to arrive at traditional benefit-cost ratios to determine viability of the interventions.

Tracing behavioural changes of traders and other beneficiaries directly and indirectly related to TF requires measuring its effects on trade and related sectors, and on the rest of the economy through other channels (e.g., trade expansion leading to increases in per capita GDP, real wages and real consumption). Efforts have been made to not only to develop a larger framework to examine the impact of TF, but of postulating how TF influences the economy, e.g., in APEC (2002), ECORYS (2009) and Warr, Menon and Yusuf (2009). Data and information from multiple sources and the use of ratings from trade specialists on effectiveness of TF would also be a way to trace the influence of TF on specified dependent variables. Duval (2006) relied on a survey of trade facilitation expert to qualitatively assess the cost and benefits of specific trade facilitation measures. Wilson, Mann and Otsuki (2004) as well as, more recently, Helble and others (2009), try to quantify the impacts of TF measures on trade behaviour. However, because the combined data include objective and subjective variables, these results often have to be complemented by other objective data.[4]

[4] A possible source of such data is the World Bank Doing Business dataset (www.doingbusiness.org), which provides quantitative export and import time and cost data rather than perception based TF performance indicators. See Djankov, Freund and Pham (2006), and Duval and Utokhtam (2009) for analysis of the impact of TF on trade using some of these indicators.

Nevertheless, the underlying framework stays with behavioural changes. What is behind the assessments of benefits and costs of various TF measures (e.g., the institution of advanced rulings, creation of post-clearance audit facilities and, electronic submission of entry documents) is the measurable stream of benefits and costs that, in turn, imply behavioural changes (on the part of the beneficiaries). In the particular exercise of looking at TF interventions as an economic project analysis, it is necessary to sift through the quantitative results with regard to whether they are all caused by the intervention or not, since comparisons of benefits before the intervention (through a TF project) and after the intervention may not be totally due to that intervention. This type of qualification also holds true for all the other behavioural analyses of TF.

Assessments not within the immediate ambit of the above framework are those that follow the movement of goods as they cross the border, go through various documentary, physical, technical and other requirements until final clearance and delivery. It is the behaviour of the goods that is being observed. However, attributing their movement to specific interventions (e.g., at various windows) requires an analogous framework for eliminating other explanations for the observations. There may be a multitude of reasons why goods movements behave the way these do during import and export formalities (e.g., the type of goods, cargo content, country of origin and intermediate ports, broker for the consignee etc.). It is important to remove alternative credible explanations before asserting that a TF measure explains the movements. The resulting changes in the movement of goods can also be transformed into equivalent volume and value of trade changes and other indirect effects in the same way that the other modes for examining TF are specified and analysed.

Automation has not really been integral to the framework that has been used in understanding how TF affects trade. In many instances, the use of IT is subsumed in the measures being studied. For example, the Global Competitiveness Report rates the level of efficiency in customs procedures but not specifically whether the customs environment is automated or not. In some instances, the use of IT in trade procedures falls far short of being automated.[5] In a number of countries in Asia, IT is only utilized up to the submission of goods declaration in electronic format. Developing a procedure to evaluate the effects of this partial IT would be difficult.

B. Experience with information technology in trade facilitation

There are not too many reviews of the use of IT as a TF measure. In fact, the recent reviews by Grainger (2007 and 2008) noted that "...it is surprising that so little literature on the subject has been produced..." Although the OECD (2005) study was principally on customs automation, it also notes the paucity of reliable data across countries

[5] Even if only certain steps in the procedures of a particular agency are automated (more specifically in electronic format) there would always be benefits, however partial. It is a matter of measuring these procedures against the alternatives. Customs procedures in some Asian countries are only partially automated.

that would allow a detailed assessment of the benefits and costs of customs automation. One way of looking at IT for TF is to consider the existing literature, which appears to fall within two distinct categories. One category provides the necessary knowledge for developing IT systems that facilitate trade. This means identifying technical conditions, associated hardware and software essential to running automation, that help move goods across different formalities. Within this set of materials are various off-the-shelf programmes that can run and operate the IT systems, or several independent IT systems that can be replicated in other environments and settings.

But the "IT for TF" in this sense appears too broad. First, the multitude of government and private agencies with border functions are part and parcel of what TF should focus on, i.e., quarantine agencies, port authorities, warehousing establishments, logistics firms, brokerage or customs house agents among many others. The importance of these different organizations depends on the types of products being moved, the location of borders, and other physical and geographical conditions in the trade transactions.

Second, the development of IT platforms often takes place modularly, i.e., within a single agency, and is dictated by its individual conditions, capacities and readiness, and facilities, among others. If the development is outsourced, as it may usually be, it would be tailored to fit the organization. Rolling out this single platform to the trade formalities can be the TF. Multiplying this development across many agencies, public and private, does not guarantee that trade facilitation will take place. For instance, there is a problem of interoperability across varying platforms; thus, instead of facilitating formal processes, the varying IT systems may even lengthen them. Another example is that an IT system for each agency may require different electronic forms; thus, electronically filed data may end up being cumbersome to traders and the different systems would then have multiple records for the same transaction.

Finally, IT being broad may not really be material to TF if there is active coordination and collaboration in the development of IT platforms. Indeed, this may require the designation of an agency to act as a hub, gateway or portal through which different systems become interoperable. Once the hub is agreed upon, the scale of TF will then depend on the speed in which the other agencies and organizations are effectively linked.

The other category of literature on IT in TF focuses on analysing and measuring the benefits from automation. Indeed, the presumption of this category is that IT is clearly beneficial, based on classic transformation in some countries. It is almost taken for granted that when IT is carried out the benefits that accrue to trade outweigh the costs that are incurred in installation, continuing maintenance and regular upgrading.

Since both categories of literature usually refer to IT in customs and customs-related procedures, their institutional reference is a country's Customs Administration. The benefits from IT depart from improvements in the area of customs formalities while the development of IT platforms concentrates on how automation can be applied in its steps and processes.

It is therefore not surprising that the documented experiences in IT for TF are mostly in customs administration. The OECD (2005) study considered different country experiences in automation among both OECD and non-OECD countries. The automation TF was viewed as a project with associated costs and benefits. Although the study admitted that cost determination was unique to country characteristics and that there was no common template, it noted that there were important parts of automation for which cost parameters were more identifiable. For example, the adoption of the off-the-shelf system, i.e., Automated Systems for Customs Data (ASYCUDA), has predictable costs in installation and maintenance; costs of computers and other hardware are readily available and some infrastructure costs are also common. In short, there are costs that allow comparability.

Automation costs are only part of the larger customs development programme in the experiences of the Russian Federation, the United Republic of Tanzania, and Central and Eastern Europe. Between 40 per cent and 60 per cent of the total costs are for automation; however, there is no indication what the remaining costs are for in those countries (OECD, 2005). It is also important to note from these various country experiences that while there is an expectation that migration to the Internet reduces costs in the long term, this upgrading will initially entail costs (e.g., Senegal's customs operation management system upgrading to a web-based version). Cost comparisons are also available between off-the-shelf systems (e.g., ASYCUDA) and those independently developed to meet particular country settings, with the latter costing 10 times more. In addition to these general investment costs, there would be costs in running the automation services when users access the facilities, submit forms and exchange messages with the system. In most instances, operating costs are shouldered by individual users on whom fees are supposed to be levied that approximate the costs of delivering the services under Article VIII of GATT 1994.

The benefits from automation go to private traders and governments in terms of greater efficiency in cargo movements, improved governance due to a reduction in smuggling and in face-to-face transactions with officials, predictable revenues, and decline in delays in transactions and their costs. The measurement of benefits from automation is mostly in terms of the reduction in the customs clearance time of goods. Country experiences with these types of benefits show wide variation, from 168 hours in Guyana to single-digit hours in other countries. This is driven home further by comparisons between automated and non-automated environments in customs procedures. Again, the differences between the two have wide variations (e.g., in Thailand, the difference is between one-third and one-quarter of the time in manual processes; in New Zealand, clearance by automation is one-forty-eighth the manual time at maximum; in Chile it is one-fifth the manual time).[6]

Stacking up this array of quantitative benefits against costs answers the question whether investment in automation pays off. The experiences of automation in the United States, Chile and Singapore are described as illustrative of the high pay-off from the

[6] In table 1 of OECD, 2005, the list of countries with customs automation includes information on the year installed, coverage of the automation system that is installed and clearance time.

application of IT in customs procedures. Indeed, the benefit stream appears so large that it becomes hardly an issue whether automation should take place. Business savings, productivity improvements and efficiencies in customs administration all point to the high benefit-cost ratio of IT.

In the more detailed analysis by the Economic and Social Commission for Asia and the Pacific (ESCAP, 2002) of the evolution of Singapore's automation more items are indicated as composing benefits and costs. For example, the direct costs (S$ 20 million in 1987) constitute the development of the system, while some traders incur indirect costs through subscription, access, equipment and set-up (some of these are one-time costs and others are recurring transactions costs); others may incur more costs, especially those that are not exposed to IT at all and thus the associated direct training costs.

On the other hand, not included in the estimated stream of benefits are those accruing to other government agencies using the system as well as other organizations that indirectly benefit such as the transport sectors, logistics providers etc. (Economic and Social Commission for Asia and the Pacific, 2002). Although it is quite clear, if not obvious, that the potential benefits from automation of customs procedures in TF are large, it also evident from the often-illustrate limited experiences that the details of these benefits and costs in a project analysis context are not adequately laid out.

A comprehensive rationale can always be found for the application of IT in TF, e.g., the United Nations Conference on Trade and Development (UNCTAD) (2006), in terms of increasing the volume of trade, globalization of production platforms and their needed speed and synchronization, increasing accessibility of telecommunications infrastructure and liberalized environments, greater interaction with the transport and logistics sectors, and expanded participation of the private sector in the management of trade processes (e.g., through privatization of ports). Indeed, electronic TF is ultimately viewed as a global portal development derived from initial stages of single-window national portals to multi-nation and regionally integrated single-window portals (McMaster and Nowak, undated).

Being technical in nature, the literature on developing the automation system for TF is broadly confined to the types of software and hardware that are essential to automating trade procedures. There is a set of "best practices" for IT in national trade facilitation (Schware and Kimberley, 1995). In addition, the use of the current version of ASYCUDA is the de facto system many developing countries adopt (UNCTAD, 2006). Even if the "best practices" for IT may have been overtaken by events with the wider use of the Internet and web platform, the focus by Schware and Kimberley (1995) on electronic data interchange (EDI) does not diminish their discussion of the many even more important enabling conditions for automation. Indeed, there are several critical ingredients essential for successful IT automation for TF – building awareness, working with potential users to prepare them for ecommerce, developing and designing messages and guidelines, and re-engineering systems. The technology costs – including technology services to be provided by a Value-Added Network (VAN) provider – are but a small part (typically between 3 per cent and 10 per cent of all costs among the case studies reviewed) of the overall costs and can be outsourced. Note that in this EDI-based automation the break-even period for typical investment is between 48 months and 72 months.

The utilization of ASYCUDA as the automation instrument for many developing countries involves its application in customs administration. Its installation clearly drives home the point above that technology is exogenous and that there are more important considerations to take in the use of IT in TF. Some of the problems that come up with the use of an off-the-shelf system, as in the case of ASYCUDA, appear when it is installed as an external application on interrelated institutions and information flows (Alburo, 2007). Thus, even if the costs of this technology are lower than other alternative systems, the associated adjustments and their costs in the long term must be taken into account. OECD (2005) reported that the installation cost of ASYCUDA was as low as US$ 1.5 million to US$ 2 million in 2002.

Many countries have likewise been successful in developing independent automation systems tailored specifically to their particular environments. Although the development costs may be high for those countries, and development may be outsourced, they take into account more closely the institutional set-up. Such countries include ASEAN members Malaysia, Singapore and Thailand, plus the Russian Federation, the Republic of Korea, Japan, the United States, and Central and Eastern Europe. There is an analogy here with regard to the use of EDI as the automation foundation in its early evolution. However, the increasing availability of the Internet (coupled with its increasing security properties) provides the difference, as even these independent systems can be made compatible with the widely used web-base to gain broad access.

It is not surprising that the development of these independent systems has triggered their participation in providing alternatives to ASYCUDA in developing automation platforms. In fact, Singapore's Crimson Logic (TradeNet), Malaysia's DagangNet, and other commercial IT providers (e.g., Microsoft) are bidding to develop independent automation in other developing countries including participation in the design of single windows. Given that these independent systems have been tested and used, they can give more options than ASYCUDA.

Several observations can be made from this review of the relationship between IT and TF. While TF has wider impacts than can be captured by a narrow component in the form of IT, the notion of facilitation would also include IT content. However, to the extent that the unique IT part can be identified, it is then possible to review what may be the underlying interaction between the two.

First, as noted by those who have earlier reviewed the role of IT in TF, there is limited literature that systematically relates the two. In addition, the usual area of analysis is customs-related automation. This does not mean that automation is only effective in, or has optimum impact on customs processes. Yet there is a dearth of understanding and analysis of IT in other areas of TF. For example, there is limited available information (not reviewed here) on how automation in quarantine procedures can facilitate trade. Many institutions and organizations have border functions and their relative importance is a function of the types of goods traded.

Second, the limited documentation of experience with IT in TF often assumes substantial benefits from automation. There is, of course, no doubt about their direction

and even magnitude. However, it is scarcely helpful for those countries considering automation to take the benefits on faith, especially if there are alternative areas for IT investments.

Third, in the customs procedures there is no indication of which parts of the overall processes are automated. It can always be assumed that it is an end-to-end automation. Yet even in this scenario benefits are non-uniform and there is still a need to measure the varying benefit streams rather than gloss over them, or worse, exaggerate them in terms of either magnitude or time flow.

Fourth, what appears to follow from the reviews is a more careful specification and analysis of the benefits and costs of IT investments. Finer details of benefits and costs allow greater deliberation of choices that governments may make in applying IT in TF. For example, the wide variation in clearance time for cargoes based on many surveys indicates a need to understand why and to explore possible sources of explanation, and for greater consciousness of what analytical tools to use in drawing a conclusion about the impacts of IT.[7] This would be especially important to least developed countries with limited resources but which are willing to invest in IT efforts with the largest impacts. There needs to be further specification of the incidence of an automated system, i.e., in which stage of the procedural flow (if it is in customs) IT is effective. Indeed, there may be cases where the stage of a country's trade does not, in fact, warrant automation, especially the type requiring custom-built design. The Revised Kyoto Convention specifically defines the use of IT only when it is cost-effective. Also, if service providers of customs IT are to come from the private sector, careful feasibility analysis may not warrant full automation.

Finally, one way of validating the magnitude of benefits and costs is to undertake a post-project evaluation comparing the actual benefits and costs with the ex ante magnitude that led to the implementation of the automation. While it is useful to validate automation by estimating all savings with the use of the facilities, it is another thing to decide on alternative IT choices

C. Trade and information technology use in small and medium-sized enterprises

The initial technology used in customs automation was EDI and its costs were considered high for small and medium-sized enterprises (SMEs). As Schware and Kimberley (1995) showed with their estimates of internal and external costs, these were high enough to become barriers to entry by SMEs. On the other hand, with many alternatives to connect to EDI (e.g., "low tech-no tech" non-computer technology and other basic devices such as the telephone, fax and telex), SMEs can still become part of an automated EDI system.

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[7] For example, one reason why the variation in cargo clearance time is so wide is because there is also wide variation in the application of trade facilitation measures by customs in this case. It is not clear if collecting more samples of cargoes can reduce such variation.

Did EDI-based IT facilities actually expand the participation of SMEs in international trade? Would this kind of platform diffuse to the wider trading system across the global community? While access by SMEs to EDI may have increased via other alternatives, this was self-limiting. In addition, the self-limitation was not due to lack of participation by SMEs but because of EDI itself. Aside from the costs involved in an EDI system and the dedicated nature of its use, Schware and Kimberley (2005) argued that it was made problematic by the hybrid nature of the system in which EDI hubs used paper for the majority of their trading partners but pure EDI for a small though growing minority of partners. This hybrid nature actually leads to higher, not lower, costs; thus, to convert all partners into EDI would take a long time. They correctly noted that the EDI "brick wall", which makes its wider diffusion self-limiting, was the work involved in installing and integrating EDI into the business systems of traders.

Developments subsequent to EDI (e.g., the use of the extendable markup language XML and transition stages through more access points) were significant in the further automation of trade procedures and processes. In addition, the integration of the Internet into both off-the-shelf and dedicated platforms drastically eased the previous constraints, paving the way for wider adoption of IT in TF. However, even with expanded IT in TF arising from reduced costs, the participation of SMEs have still apparently lagged behind, although this is not just from the IT application but more generally in the internationalization of the SMEs.

IT in TF for SMEs is set in a larger context in APEC (2003). Here, e-commerce is seen as providing unique opportunities for SMEs in the APEC economies to gain greater access to international trade. E-commerce technologies help SMEs realize reductions in direct costs and increase efficiency savings that arise because of border delays and documentation and which tend to add to the landed price of various products. On the other hand, the streamlining of customs, "... quarantine, health, and port services provided by government agencies to the trading community..." can provide efficiency savings to resource- and time-deficient small businesses (APEC, 2003). For small businesses to benefit, IT should be seen as part of a comprehensive package involving all the facets of e-commerce, thus including telecommunications infrastructure, legality of digital information and signatures, security concerns, common if not harmonized standards, and cultural and language differences. These are concerns that go beyond the need for automating trade formalities and how this would affect SMEs.

What constitutes barriers to international markets often discriminates against SMEs, since large companies usually have resources to minimize risks in international commerce, including strong lobbies for favourable laws and regulations (Fliess and Busquets, 2006). In the context of increasing globalization, most SMEs that are accessing international markets have to face up to the need for networking with global firms and become part of supply chains. They become more vulnerable to access constraints. More apparent among these constraints is the non-tariff barriers that SMEs face in their trade, e.g., through high costs of customs administration and restrictive health, safety and technical standards, in which various procedures are involved. Automating these processes and

procedures in some way makes their barriers to SMEs more predictable, and costs can be adjusted if not minimized.

Even before actually engaging in international trade, SMEs are hampered by difficulties in obtaining information about laws, regulations, advisory services and even market opportunities. Without a way of obtaining regular information, SMEs tend to incur more costs and time in getting such types of information than large companies, which have more extensive resources. This means that part of TF for SMEs would include easy access to information that gets them into global commerce. The application of IT involves two parts – access to electronic sites (e.g., chambers of commerce and industry associations) that provide information services that SMEs can use, ranging from market information to advisory services as well as access to electronic information on government procedures, requirements of agencies that process trade transactions and product specific information or links (Global Facilitation Partnership for Transportation and Trade, 2005).

Once these types of facilities are provided there is still no assurance that SMEs will actually end up engaging in international trade. Many reasons have been advanced, based on surveys and research, for SMEs' inability to exploit opportunities in export businesses and to source inputs through importation. Despite the potential arising from globalization, a great deal of international commerce is done through network firms and multinationals. Large firms have actually been dominating in this set-up. SMEs wanting to participate in this globalization process must overcome existing barriers posed by large multinationals. Even for SMEs in developed countries these barriers are quite imposing – big firms are able to leverage their large volumes to extract price, services and other add-ons not available to SMEs (Shatz, 2004 and Goldsborough, 2005)

Without internal adjustments on the part of SMEs, they remain outside global commercial transactions. In fact, a number of these adjustments would be IT-related, such as process re-engineering, integration of business functions to improve coordination, links among suppliers, vendors, partners and customers, and adoption of specific application programmes related to international trade (Goldsborough, 2005). In other words, SMEs have to gear up to be capable of electronic link-ups with the external trading community through internal capacity improvements not only of human resources (e.g., IT expertise) but also the acquisition of necessary equipment and facilities as well as their appropriate upgrading. Where an option may be in the form of outsourcing some of the preparatory system, it is important that the SMEs see their own adjustment as essential before capturing the optimal benefits from exogenous IT-related TF measures.

Poor participation by SMEs in international trade can thus be partly traced to the firms themselves and not only to the trading environment, which also implicitly favours large enterprises. Of course, problems with the trading environment may be onerous, especially for SMEs as they often suffer from size limitations and lack of modern technology. Thus, the environment places a relatively larger burden on them than on large firms (European Community, 1999). What is emphasized is that SMEs become aware of best international practices in global commerce and the role that TF measures can play in ensuring their participation.

Ultimately, the importance of IT to SMEs must be answered by the firms themselves. Assuming the boundaries of IT in TF for SMEs include the various procedures and processes involved in trade formalities, the question is whether these are important to SMEs. If these are considered barriers by SMEs they are more external than internal, i.e., they are part of the SMEs' business environment or accessibility to international markets. International SMEs, however, are not only synonymous with exports but also with importation for eventual export. They form part of the production platform where firms are linked because of horizontal integration and component manufacturing.

One partial answer to the question of importance can be gleaned from a study of SMEs across the APEC economies and OECD members (OECD-APEC, 2006). A total of 978 SMEs were surveyed together with a matching survey of OECD-APEC Governments on the same question of ranking barriers to SME internationalization. The results indicated that what the policymakers and SMEs commonly perceived as the 10 most important barriers to internationalization centred around capabilities (e.g., lack of trained personnel for internationalization and developing new products), finance (e.g., shortage of working capital) and access (e.g., limited market information, identifying business opportunities and unfamiliar export procedures/paperwork). The business environment (e.g., unfamiliar business practices), while ranked among the top 10, fell within the lower half of the perceived barriers. The IT-related barrier, "high costs of customs administration", ranked twenty-ninth in importance to SMEs (and thirty-eighth in importance to governments).

Combining the surveys of policymakers and SMEs makes it possible to determine what are commonly viewed as barriers to becoming international firms and the relative importance of such barriers (summarized above). From both the government and SME sides, barriers that TF measures are supposed to address are not viewed as highly important. They certainly do not rank among the most difficult barriers to overcome. On the other hand, these results do not appear to contradict the characterization of SMEs from other studies. Indeed, they reinforce each other.

Table 1 and figure 1 reproduce the ranking of barriers to SME internationalization from the combined perceptions of policymakers and SMEs, and the ranking by SMEs alone, respectively. The top 10 ranking method provides consistency between what is seen by the firms and what is seen by the policymakers as inhibiting the entry of SMEs into international trading.

The OECD-APEC (2006) study does not explain these results, some of which are surprising given the types of benefits that TF measures provide to SMEs. Moreover, the results are consistent with what OECD-APEC economic policymakers perceive as important barriers faced by SMEs in internationalization. On the other hand, these results also support earlier arguments that much of the internal efforts by SMEs are more important in achieving access international markets than what facilities are in place to facilitate trade, including IT.

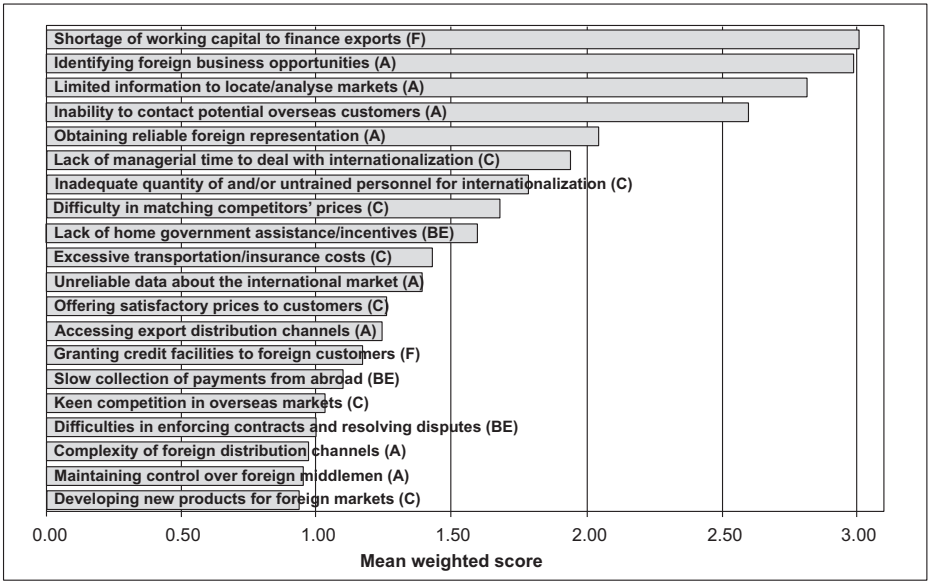
These results may not really represent the sentiments of most SMEs, especially those from developing countries or those that are contemplating entering international markets. In addition, the study admitted that there was "...a high degree of concentration

Table 1. Top 10 barriers to SME access to international markets as reported by OECD member countries

Rank-weighted factor	OECD 1997 classification	Description of barrier
1	Capabilities	Inadequate quantity of and/or untrained personnel for internationalization
2	Finance	Shortage of working capital to finance exports
3	Access	Limited information to locate/analyse markets
4	Access	Identifying foreign business opportunities
5	Capabilities	Lack of managerial time to deal with internationalization
6	Capabilities	Inability to contact potential overseas customers
7	Capabilities	Developing new products for foreign markets
8	Business	Unfamiliar foreign business practices
9	Environment Capabilities	Meeting export product quality/standards/specifications
10	Access	Unfamiliar exporting procedures/paperwork

Source: OECD Member Economy Policymaker Survey and SME Survey, 2006

Figure 1. Top 10 barriers to internationalization as ranked by SMEs



Source: OECD-APEC 2006.

[of samples from] within just 7 member economies: Canada (217), Greece (128), Switzerland (118), Turkey (77), Japan (74), Spain (60) and New Zealand (52)..." (OECD-APEC, 2006). Indeed, the developing country members of APEC (as well as other economies that are added to the sample, such as Nepal) are underrepresented except for Mexico and Chile (25 and 21 SMEs, respectively). Unfortunately, no sub-sample report exists of the important barriers faced by the developing countries, which would have allowed tests of significance from the aggregate results.

Similarly, the study also stratified the SMEs into those not active in exporting, those aspiring to be exporters and those actively exporting; it also captured those that were importing (under the same classifications) with enough numbers among the categories (e.g., 4.3 per cent not active in exporting, 27.6 per cent aspiring and 68.1 per cent actively exporting). Again, unfortunately, no report exists of how the perceptions differed according to the actual participation of the SMEs in international trade (e.g., it can be argued that those actively trading find IT more important than those not active, or even those aspiring SMEs who have yet to experience internationalization).

Because the distribution of the SMEs was skewed towards the more developed economies and, conversely, the small size of the SMEs from developing economies, finer-level analysis of the barriers they face may not be possible. However, there can still be insights, if the SMEs are further analysed according to their actual state of internationalization, into where TF may become more important. The clustering of different barriers can also provide useful insights into their varying importance to SMEs.

The fit of SMEs in trade facilitation is not as simple as it is often made out to be. As the above review of existing knowledge shows, there are many ways of looking at how SMEs enter global markets as well as where IT appears to be important. It seems clear that reduction of time for processing documents, simpler procedures for moving goods in and out of ports, and improved coordination among the agencies with which SMEs deal in connection with trade, all contribute to their efficiency and thus profitability. Yet, there are other equally important pre-requisites that SMEs must meet before they can effectively venture into the global market – internal adjustments that include greater use of IT in firm operations as well as other office routines that need retooling in order to cope with the way international transactions are conducted.

D. Summary and implications for inclusive growth

The literature on TF is extensive and it has not been exhaustively reviewed here. However, it falls into two distinct categories. One category analyses the broad macroeconomic effects of TF, which means looking into the impacts on aggregate outputs, employment and prices, among other areas. The other category analyses TF effects on narrower sectors of the economy, usually the trade areas. The former therefore uses macroeconomic methodologies while the latter relies on microeconomic and behavioural models. Both, however, use similar ways of indicating the TF measures that are analysed. IT is only a part, and sometimes a small part, of all types of TF activities.

While the results of most studies, whether aggregate or of narrower areas, indicate the large quantitative benefits from TF, in terms of the specific questions of the use of IT in general and automation of trade formalities in particular, several observations can be derived from the limited reviews in this chapter.

First, it appears that the description of benefits appears too broad. Indeed, in some of the assessments of IT in TF, the benefits are taken more as matter of faith than of detailed specification, and may turn out to be overstated.

Second, the costs of these IT systems for TF are often not given finer specification. Whether costs are all to be borne by government investments or some are to be shouldered by private traders is neither clear nor unambiguous. Certainly the operation of IT systems, for example, in customs declarations involves not just Customs Administrations but network providers for which traders either subscribe or reconfigure their internal systems.

Third, it is not clear which part of the process of goods movement is the target of IT; and neither is there a clear picture as to how different agencies with border functions relate to IT development (which is usually undertaken in one agency, e.g., customs).

Fourth, there is no documented experience about the effects of partial automation, i.e., where IT is applied only to particular parts of processes (e.g., entry lodgement or submission of licence applications) in measurable ways.

Finally, in the specific cases of IT applications to TF, the experience appears to indicate these have either been “plug-ins”, i.e., exogenous to the institutions or agencies or customized, but still technically outsourced in development and in eventual installation and operation.

These considerations, especially those related to the stream of quantitative benefits and costs, are important for countries that are contemplating using IT as a TF instrument. They need systematic insights into: (a) what implications there are for partial versus full automation and in which part of the processes; (b) which border agencies experience the largest impacts from IT applications; and (c) the costs that would be borne by private traders and associated transactions arising from IT. More importantly, any public investment in IT for TF has to be solidly based as project analysis and economic internal rates of return evaluation. Put differently, without sufficient knowledge about the relative benefits of IT among different configurations, investments of scarce resources by poor countries are not likely to be optimal.

The internationalization of SMEs is the underlying reason for looking at the role of IT in TF among such businesses. There is a dearth of literature on automation and IT in TF, particularly in the case of SMEs. Again, the limited knowledge that is available apparently indicates that the importance and functions of TF and IT for SMEs are wide in range. Indeed, there appear to be important preconditions that SMEs need to meet before they can effectively participate in international commerce. Size, technology, and the lack of networks and information are among the many barriers that SMEs need to overcome in order to become internationalized. IT in TF therefore may not be effective without prior

upgrading by these businesses, especially among those SMEs that aim to become direct international traders (as opposed to being indirect traders).

SMEs play a significant role in economic development. In most developing countries, they account for a large share of employment, contribute to aggregate value added, and are spread more widely in location. A considerable number of them are exporters and thus are earning foreign exchange. The global community sees it as imperative that no potential international trader is excluded from international commerce (European Community, 1999). Facilities ought to be provided to those with trade potential, either in the form of TF measures or outright support. To the extent that SMEs are potential traders but face barriers to entry, they should be provided with all TF support measures, including access to IT applications in trade.

From among the many TF measures, some may be more neutral in terms of who benefits (e.g., basic infrastructure such as roads) while some may benefit larger-sized traders more than smaller-scale traders (e.g., container yards). There may be other measures that benefit smaller-scale traders more than larger-sized traders (e.g., basic information on procedures). In the case of IT, it is important to understand the means by which the facility may be delivered. In particular, it may be of importance to SMEs (a) which trade-related agencies have automated their functions, and to which parts of the functions IT has been applied (if it is not end-to-end), (b) the method and requirements for accessing the facility, and (c) the costs involved in participation. For these reasons, some relevant experiences are essential to gaining an understanding of what the implications would be for SMEs. As the review in this chapter shows, there is not much systematic knowledge of this aspect.

Apart from the benefit-cost stream noted above, it is also essential to know if SMEs have been considered in the development of IT for TF, whether it is for off-the-shelf or custom-built technology. From the viewpoint of governments or donor agencies, when evaluating alternative ways to apply IT to trade a more specific project analysis is needed than that currently documented in the relevant literature. Indeed, what becomes critical in any evaluation process is the long term implications of different systems, not only for the specific agency where IT is to be applied but also for other agencies with which it has functional relations. From the viewpoint of traders, they need information about what is required of them in the automation process so that appropriate adjustments can be implemented; this is more so in the case of smaller-scale traders if they are to be part of the IT for TF. Differing technical conditions imposed by different systems will have impacts on trader behaviour.

An IT system for trade would be part of the array of trade facilitation measures that countries institute to speed up the movement of goods across borders. How much the facility would be utilized becomes a function of both the system and the users of such a system. The degree to which SMEs utilize an IT-based TF facility appears to depend on several preconditions that are short of actual engagement in internationalization and cross-border transactions. There is insufficient documented experience for providing specific clues about what makes SMEs use an IT facility for trade transactions and how they do so. For example, SMEs could use third (and outside) parties to handle IT-related

transactions such as brokerage and related services. Or the entire IT-related functions for SMEs could be outsourced. All that is known from limited surveys is that other issues exist that are more important barriers to SMEs in internationalizing their business, and that the procedures involved in buying or selling goods in global markets – and which IT helps overcome – rank low in their perception. Thus, unless these issues are addressed first, IT facilities for TF may be under-utilized.

What is useful in this regard is the argument of the Swedish National Board that "...it is thus not essential for a [developing] country to have a fully-developed IT infrastructure, even if IT solutions in a longer perspective is [sic] very preferable..." (Swedish Trade Procedures Council, 2003). Sometimes the use of electronic and IT solutions may lie far into the future since "...any technological solution will be close to ineffective without a rationalized and standardized administrative foundation to build upon..." (Swedish Trade Procedures Council, 2003). What is needed is an examination of the underlying rationale for eventual use of IT for transaction purposes. This is consistent with the argument that for SMEs to use IT for TF facilities there must be prior conditions that effectively prepare them for the more elaborate electronic requirements of international commerce. On the other hand, as pointed out above, some of their information needs are provided by web-based sites, for which some basic infrastructure is critical. The configuration of this infrastructure also needs to be spelt out.

In summary, several foundational elements are important to understand how SMEs are affected by trade facilitation, and the use of IT in TF. Only through a more systematic understanding of the conditions and actual environments in which SMEs operate – and the extent to which they are engaged in international trade – will it be possible to determine the effectiveness of TF for SMEs.

References

Alburo, F. (2007). "Defining IT transition in trade facilitation" (unpublished manuscript).

APEC (2003). *Small Business and Trade in APEC: A Report Highlighting the Contribution of Medium, Small and Micro Enterprises to the Asia-Pacific Region.* APEC Secretariat, Singapore.

_____ (2002). *The Benefits of Trade and Investment Liberalization in APEC*. APEC Secretariat, Singapore.

Arvis, J-F., M. Mustra, J. Panzer, L. Ojala and T. Naula (2007). *Connecting to Compete: Trade Logistics in the Global Economy.* World Bank, Washington, D.C.

Djankov, S., Freund, C. and Pham, C.S. (2006). "*Trading on Time*", World Bank Policy Research Working Paper No. 3909.

Duval, Y. (2006) *Cost and Benefits of Implementing Trade Facilitation Measures under Negotiations at the WTO: An Exploratory Survey*. Asia-Pacific Research and Training Network on Trade Working Paper Series. No. 3. January. Available at: www.unescap.org/tid/artnet/pub/tipub2466.pdf

_____ and C. Utokhtam (2009). Behind the Border Trade Facilitation in Asia-Pacific: Cost of Trade, Credit Information, Contract Enforcement, and Regulatory Coherence. Trade and Investment Divsiosn Staff Working Paper Series. No. 02/2009. ESCAP, United Nations. Available at www.unescap.org/tid/publication/swp209.pdf

ECORYS (2009). *Trade Sustainability Impact Assessment: The EU and the ASEAN Countries.* (http://tsia.ecorys.com/asean/)

Economic and Social Commission for Asia and the Pacific (2002). *Trade Facilitation Handbook for the Greater Mekong Sub-Region*. United Nations, New York.

European Community (1999) "Contributions to the WTO: Trade Facilitation and Development: Communication from the European Community" *Trade Issues* (http://ec.europa.eu/trade/issues/sectoral/facilitation/wto_nego/tradefac1.htm).

Fleiss, B. and C. Busquets (2006). *The Role of Trade Barriers in SME Internationalization*. OECD, Paris.

Global Facilitation Partnership for Transportation and Trade (2005). "Enabling SMEs to enter the international supply chain". Available at www.gfptt.org.

Goldsborough, B. (2005). *State Policy, California Exports and SMEs: Supply Chain Logistics as Tool to Increase Global Market Share*. Woodacre, California: Logistics Alliance Strategies and Associates (LAS).

Helble, M. and others (2009). "Transparency and Regional Integration in the Asia Pacific", *The World Economy,* vol. 32, No. 3, pp. 479-508.

Grainger, A. (2008). "Customs and trade facilitation: From concepts to implementation", *World Customs Journal*, April 2008, pp. 17-30.

_____ (2007). *Trade Facilitation: A Review.* TF Consulting Ltd., United Kingdom.

McMaster, James and T. Nowak (undated). "The evolution of electronic trade facilitation: Towards a single window trade portal". University of South Pacific, Suva.

OECD (2005). "The role of automation in trade facilitation", OECD Trade Policy Working Paper No. 22. Paris.

OECD-APEC (2006). *Removing Barriers to SME Access to International Markets.* APEC Secretariat, Singapore and OECD, Paris.

Schware, R. and P. Kimberley (1995). *Information Technology and National Trade Facilitation: Guide to Best Practices*. World Bank, Washington, D.C.

Shatz, H.J. (2004). "State international business programs: Organization, evaluation and oversight", testimony at hearing on "International trade: Reassessing structure and process", California State Assembly Select Committee on California's Foreign Trade Offices. Public Policy Institute of California Occasional Paper. Sacramento, California.

Swedish Trade Procedures Council (2003). *Trade Facilitation from a Developing Country Perspective*. National Board of Trade, Stockholm.

UNCTAD (2006). *ICT Solutions to Facilitate Trade at Border Crossings and in Ports*, UNCTAD/TD/B/COM.3/EM27/2. New York and Geneva.

Warr, P., J. Menon and A.A. Yusuf (2009). "Regional economic impacts of cross-border infrastructure: A general equilibrium application to Thailand and Lao PDR" (draft manuscript).

Wilson, J.S., C.L. Mann and T. Otsuki (2004). "Assessing the potential benefit of trade facilitation: A global perspective", World Bank Policy Research Working Paper 3224. World Bank, Washington, D.C.