

The Impact of Standards on Developing Country Exports

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Question

What evidence exists concerning the (sub-)sectors within developing economies where:

- a. complying with existing standards used in international trade pose the greatest costs/barriers¹ to potential export opportunities?*
- b. adopting existing standards or developing new standards² for use in international trade have, or could, catalyse potential export opportunities?*

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¹ Such barriers might include, for example, enforcement mechanisms, funding shortfalls, lack of information or technical expertise, differing requirements between export markets, lack of participation in standards development, and so on.

² For instance, where the implementation of a new standard helps to differentiate a good's quality, creating demand for it in export markets (e.g. Argan Oil).

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1. Overview

This ten-day rapid review provides an annotated bibliography of empirical literature on the relationship between standards and developing country trade. The review has two objectives: (i) to present the state of the evidence on sectors in which standards are net *barriers* to developing country exports and sectors in which standards are net *catalysts* to developing country exports; and (ii) to assess the strength of this evidence and identify gaps. The focus of the review is *public, voluntary standards* as specified in the Terms of Reference.

Research approach

In line with the project's revised Terms of Reference, the research took a two-pronged approach to searching the literature: a "structured" search and a flexible search.

The structured search entered pre-determined search terms into key institutional databases (see Table 1). These search terms were slightly adapted from the Terms of Reference. Initially, the reviewer searched on "trade", "standards" and "developing countries" in Title and Abstract or All Fields. If necessary, the search was then narrowed using the additional terms "impact", "economic", "trade-distorting", "trade-enhancing" and "development". Finally, when database search engines offered this functionality, the reviewer searched on "tag: standards" and/or "tag: technical barriers to trade" and/or "tag: sanitary & phytosanitary measures" to further refine the search. For each database, the top 20 search results were screened for relevance. Literature published before 2008 was excluded. Included literature addressed variations on either of the following questions:

- What is the impact of standards on developing country trade?
- Why/ when/ how do standards act as a barrier/ catalyst to developing country trade?
- What are the methodological issues in measuring the impact of standards on trade?

"Standards" was defined broadly to include mandatory standards (i.e. regulations), voluntary public standards (national and international) and voluntary private standards. Though the review's focus is voluntary public standards, a broad definition was necessary due to the empirical literature's overwhelming tendency to conflate standards and regulations. Additionally, literature using the UNCTAD/ WTO terminology of sanitary and phytosanitary (SPS) measures, technical barriers to trade (TBT) and pre-shipment inspections was included, since these terms all refer to standards under the review's broad definition (Ederington & Ruta, 2016: p.6). The review similarly adopted a broad understanding of trade. While most of the included literature uses developing country exports as its dependent variable, the review also summarises research on the impact of standards on developing countries' export diversification and developing countries' inclusion in global value chains (GVCs). Since 80% of global trade is estimated to occur in GVCs, developing country producers' ability to access these is an appropriate proxy for their available export opportunities (Kaplinsky & Morris, 2017: p.5).

The flexible search identified additional literature from the reference lists of relevant publications retrieved during the structured search. It used the same relevance criteria, but relaxed the requirement that literature be published after 2008. These studies are marked with an asterisk in the detailed summaries below.

Research results

The structured search generated 21 relevant studies (Table 1) and the flexible research generated three further studies resulting in a total sample of 24 studies. The review has classified these studies according to their research design and sectoral focus:

- **Methodological discussions.** These papers examine common methodological issues in the literature, particularly surrounding the measurement of standards and the quantification of trade effects. They provide important insights into the quality of the available evidence. Five studies are included in this category.
- **Secondary research evidence: multi-sector studies.** These studies summarise the state of the evidence on the relationship between standards and developing country trade, drawing on primary research from multiple sectors. They are useful for generating cross-sector comparisons, though this is not necessarily their primary research question. Since many of them aim to be comprehensive (if not systematic), they are also useful for understanding the size, quality and consistency of the literature on standards and trade. Nine studies fit this category
- **Secondary research evidence: single-sector studies.** These studies summarise the evidence on standards and trade in a particular sector. Four studies are included in this category, all with a focus on the agriculture and food products sector.
- **Primary research evidence: multi-sector studies.** One study conducted a comparative analysis of the impact of standards on trade across sectors using primary data.
- **Primary research evidence: single-sector studies.** Five studies generated primary evidence on the impact of standards on trade in a particular sector. Four of these focused on the agriculture and food products sector, and one on the manufacturing sector.

Table 1: Results of structured search

Database	Search terms	Total results	Relevant results
European Parliament	All fields: Trade, standards, developing countries, impact, economic, trade-distorting, trade-enhancing, development	132	0
International Centre of Trade and Sustainable Development (ICTSD)	Tag: standards	23	6
International Electrotechnical Commission (IEC)	All fields (publications): Trade AND standards AND developing countries	1	0
International Organization for Standardization (ISO)	All fields (publications): Trade AND standards AND developing countries	8	0
Organisation for Economic Co-operation and Development (OECD) iLibrary	Title and Abstract: trade, standards, developing countries Theme: Trade	11	2

Standards and Trade Development Facility (STDF) Virtual Library	All fields: Trade, standards, developing countries, impact, economic, trade-distorting, trade-enhancing, development	379	5*
United Nations Conference on Trade and Development (UNCTAD)	All fields: Trade, standards, developing countries	7,818	3
United Nations Industrial Development Organisation (UNIDO)	No search function.	N/A	1
World Bank	All fields: Trade, standards, developing countries, impact, economic, trade-distorting, trade-enhancing, development	273,000	3
World Trade Organisation (WTO)	Tag: sanitary & phytosanitary measures Tag: technical barriers to trade	6	1

*Additionally, STDF retrieved three relevant studies (UNCTAD, 2013a; UNCTAD, 2013b; Moisé et al., 2013) that were also retrieved from UNCTAD and OECD.

Key findings

- Three multi-sector secondary reviews find that standards *generally* act as a barrier to developing country trade in agriculture, but have a catalytic effect in certain manufacturing sectors. However, the significance and magnitude of this effect varies across developing countries, sub-sectors and exporting firms. Indeed, the over-arching finding of the reviewed literature is that the impact of standards on developing country trade is highly *context-specific*. Even studies that sample similar countries, sectors and types of standard draw diverse conclusions on whether standards' net trade effect is positive, negative or neutral.
- In order to explain the heterogeneity of these findings, more recent empirical literature focuses on unearthing the causal pathways by which standards impact on trade. Rather than simply estimating the net trade effects of standards in a particular sector or industry, they generate evidence on the factors that lead standards to act as barriers to exports in certain contexts and catalysts in others. These include, inter alia:
 - *Harmonisation/ mutual recognition*. Better harmonised or mutually recognised standards are generally found to catalyse trade for participating countries but act as a barrier for non-participating countries, particularly for developing countries.
 - *Compliance and/or conformity assessment costs*. The literature finds that variations in the costs of standards compliance across (sub-)sectors, countries and firms explain why standards catalyse trade in certain contexts and not in others.
 - *Capacity and supply-side constraints*. Access to technical assistance, skills, equipment, credit and other supply-side inputs is also found to be an important determinant of which countries/ firms benefit from standards.
 - *Availability of information on standards/ markets*. Access to knowledge or information on standards is another important factor in exporters' ability to comply with standards.
 - *Availability of (credible) conformity assessment infrastructure*. Some research finds that the availability of credible conformity assessment infrastructure, such as testing

and certification services, is the most important determinant of standards' impact on developing country trade.

Additional causal pathways are investigated by individual studies and their findings are included in the detailed summaries.

- The myriad causal pathways proposed by the literature hint at the complexities of the relationship between standards and trade. More research is required to understand the relative saliency of these causal factors, and whether they vary systematically across (sub-)sectors.

Evidence assessment

The secondary research evidence provides insights into the size, quality and consistency of the empirical literature on standards and trade. The literature has grown considerably in the past ten years. (Indeed, this is demonstrated by the relatively large number of secondary reviews included in this annotated bibliography). There is a particularly large body of evidence on the impact of standards in the food and agriculture sector, reflecting (i) the importance of this sector for developing countries and (ii) the historically high incidence of standards in this sector.

However, the quality of the literature suffers from a paucity of accurate, complete, cross-country standards data. This reflects the difficulty of measuring standards, which are qualitative and highly heterogeneous by nature. These measurement issues bias the estimates of econometric models, which remain the most common method for analysing the impact of standards across countries. Newer literature is working to develop better cross-country measures of standards compliance (see UNIDO et al., 2016).

As already discussed, the findings of the empirical research on the impact of standards on trade are highly inconsistent. Even within the same sub-sector, there is evidence to support standards acting as a barrier to developing country exports and evidence to support standards acting as a catalyst, rendering cross-sector comparisons difficult. In part, this reflects the literature's methodological shortcomings. More generally it demonstrates that the appropriate question regarding the impact of standards on trade is not "what?", but "why/ when/ how?". Understanding the salient factors that determine whether standards catalyse or impede developing country exports is a priority for future research.

2. Methodological discussions

Measuring standards

World Trade Organization & United Nations Conference on Trade and Development. (2012). *A Practical Guide to Trade Policy Analysis*.

<https://vi.unctad.org/tpa/web/vol1/vol1home.html>

The TRAINS database (for TRade Analysis and INformation System) hosted by UNCTAD is the *primary* cross-country data source for non-tariff measures (NTMs) (including standards), but has significant flaws. Key among these is that TRAINS reports NTM data in the form of incidence at the national tariff line level. That is, each NTM is coded in binary form at the level at which measures are reported by national authorities (one if there is one, zero if there is none), allowing for estimation of *coverage ratios*, i.e. the proportion of tariff lines coded as ones in the total number of tariff lines. The limitation of this approach is that it does not distinguish between mild

and stiff measures. For instance, a barely binding quota is treated the same way as a very stiff one. Unfortunately, there is no perfect fix for this problem and the binary form is probably the best compromise between the need to preserve as much information as is possible and that of avoiding errors in reporting (the more detailed the coding, the larger the scope for errors) (p.80).

Josling, T. & Roberts, D. (2011) *Measuring the Impact of SPS Standards on Market Access*. International Food & Agricultural Trade Policy Council.

<http://www.standardsfacility.org/sites/default/files/48632882.pdf>

Constructing and using databases of SPS and related measures is in its infancy. Progress has been made in establishing “enquiry points” for information about importer regulations, and the notification of new measures to the SPS Committee has also increased transparency. Translating this piecemeal information into a comprehensive database that can be used to present a more complete picture of the aggregate SPS measures a country may have in place, or to monitor improvements in market access and focus attention on remaining problems will take much time and effort,

UNCTAD’s TRAINS database contains information on the incidence of NTMs by country but is generally agreed to have incomplete coverage and a classification system that is out of line with current regulatory regimes. Moreover, it lacks detail on the *stringency* of standards which is required for accurate empirical modelling.

Fliess, B., Gonzales, F., Kim, J. & Schonfeld, R. (2010). *The Use of International Standards in Technical Regulation*. OECD Trade Policy Papers, No. 102. Paris: OECD.

<http://www.oecd-ilibrary.org/docserver/download/5kmbjgkz1tzp-en.pdf?expires=1511421159&id=id&accname=guest&checksum=06D71968E054AB1407457C006E683CE8>

The research question is: “To what extent are governments drawing on relevant international standards in their technical regulations?” The paper illustrates the difficulty of identifying, for a given sector, which public standards are used, for which regulatory objectives, and with which links – direct or indirect – to standards used internationally. While a number of sources of data exist, including electronic databases maintained by governments, they cannot be used to obtain systematic, international perspective, because there is no harmonised international format and they are incomplete.

Quantifying trade effects

UNCTAD. (2013). *Quantification of the Effect of Non-Tariff Measures*. In UNCTAD, *Non-Tariff Measures to Trade: Economic and Policy Issues for Developing Countries* (pp. 17-22). Geneva: United Nations Publishing.

http://unctad.org/en/PublicationsLibrary/ditctab20121_en.pdf

(Also retrieved from <http://www.standardsfacility.org>)

The main methodology for estimating the average trade effect of non-tariff measures (including standards) across countries is a “gravity equation”. Gravity equations are econometric models that predict that the value of trade between two countries will be positively related to the size of their economies and inversely related to the distance (and other measures of trade costs) between them. In order to estimate the effect of policies such as standards on trade, gravity equations which include measures of these policies (e.g. coverage ratios) as explanatory variables are fitted over cross-country or panel data.

$$\ln(\text{VALUEOFTRADE}) = a + b_1\text{NTM} + cX$$

where “X” is a set of variables that may also affect where “X” is a set of variables that may also affect trade flows. It typically includes GDP, distance and other trade costs.

This econometric method has numerous shortcomings. First, given lack of accurate cross-country data on NTMs (see above), the explanatory variable capturing standards often contains measurement inaccuracies, leading to biased estimates. In particular, coverage ratios which measure the incidence of standards across countries fail to capture their stringency. Second, the results obtained are likely to be sensitive to the details of the econometric techniques used.

Alternative approaches

UNIDO, Norad & Institute of Development Studies. (2015). *Meeting Standards, Winning Markets: Trade Standards Compliance 2015*.

www.unido.org/tradestandardscompliance

Given the difficulties of (i) measuring the incidence and stringency of standards across countries accurately and (ii) quantifying the impact of these standards on trade, UNIDO et al. suggest an alternative approach. They propose measuring countries’ capacity to comply with technical regulations and standards in international markets directly. The research develops three measures of a country’s standards compliance capacity: i) *import rejection data* (data on official rejections of developing country agrifood exports by key import markets); ii) *a corporate buyers’ compliance confidence survey* (data on corporate buyers’ perceptions of the compliance capacity of developing country producers) and iii) *a Trade Standards Compliance Capacity Index* (aggregated data on the quality and conformity assessment infrastructure in developing countries). Together, these measures offer “a relatively comprehensive and consistent picture of the performance of particular developing countries in complying with technical regulations and standards in [various] international agrifood markets” (p. 5).

3. Secondary research evidence: multi-sector studies

Developed and developing countries

WTO. (2005) *World Trade Report 2005: Exploring the links between trade, standards and the WTO*. *

https://www.wto.org/english/res_e/booksp_e/anrep_e/world_trade_report05_e.pdf

Research question: What are the effects of standards on (i) trade and (ii) welfare?

Research design: Non-systematic review. Inclusion criteria are all theoretical and empirical literature that addresses the research question.

Key findings:

- **Barrier or catalyst:** Economic *theory* suggests that standards may be trade-creating or trade hampering (p.57). On the demand-side, standards may affect the willingness of consumers or firms to pay for foreign products by addressing information asymmetries on product compatibility, safety/quality and environmental impact. On the supply-side, standards may affect foreign producers’ fixed and variable costs through myriad channels, e.g. by necessitating investment in new technologies or inputs or generating economies of scale.

The interplay of these demand- and supply-effects determine whether a standard increases or decreases trade flows.

The *empirical* literature on the effect of standards on international trade flows is limited at the time of writing. The earliest literature examines the impact of standards on the costs of tradable goods by collecting survey or case study data from exporting firms. This literature finds that standards have a negligible effect on the production costs of OECD firms, but can greatly increase costs for developing country exporters. These costs vary across developing countries, as well as across sectors/ firms within those countries. Later literature examines the impact of standardisation activity on trade flows using econometric techniques. These studies focus on *developed* economies and generally find that adoption of standards increases bilateral trade. However, the quality of this literature is low (see below).

- **Causal pathways:**

- i. *Standard type/ function.* A standard's function is likely to determine whether it is a catalyst or barrier to trade (p.57). Economic theory identifies three core functions of standards: ensuring product compatibility, providing information on product quality/ safety and environmental sustainability. Compatibility standards are most likely to *increase* trade flows by allowing network externalities to be captured and reducing coordination costs. *Thus, theory predicts that standards are most likely to be trade-enhancing in sectors with strong network effects, such as telecommunications, personal computers, electronic equipment and car-manufacturing.* However, the impact of quality/ safety or environmental standards on trade is more ambiguous and context-specific. Empirical literature on the relationship between a standard's function and its impact on trade is limited, however.
- ii. *Harmonisation/ mutual recognition.* Harmonised or mutually recognised standards are "commonly believed" to catalyse trade (p.54). However, economic theory is ambiguous on this issue. On the one hand, harmonised standards reduce information asymmetries between exporters and importers to a greater extent than national standards, and may also reduce compliance costs for exporters, thereby boosting trade. On the other hand, harmonization can reduce product variety in international markets. Additionally, gains from harmonisation will not be distributed evenly among participating countries. Harmonisation to a specific standard may imply a higher one-time compliance cost for some countries, particular if a lack of resources or expertise prevents them from negotiating a favourable outcome during standard-setting (p.54). Again, empirical evidence on the impact of standards harmonisation on trade is lacking.

- **Policy recommendations:** Not discussed explicitly.

Treatment of standards: The review discusses private and public standards, as well as mandatory public standards (i.e. regulations) and voluntary public standards. It notes that, empirically, voluntary and mandatory public standards might have different impacts on trade but this evidence is lacking (p.66).

Assessment of literature: The review finds that the *size* of the empirical literature on the effect of standards on trade is small, "reflecting the difficulty of the subject and lack of data" (p.66). Additionally, evidence on causal pathways, including the impacts of different types of standards on trade and harmonisation on trade, is lacking.

Quality:³ High.

Swann, G.P. (2010). *International Standards and Trade: A review of the empirical literature. OECD Trade Policy Working Papers, No 97.* OECD Publishing. *

<https://www.oecd.org/tad/45500791.pdf>

Research question: What is the econometric evidence on the relationship between standards and trade?

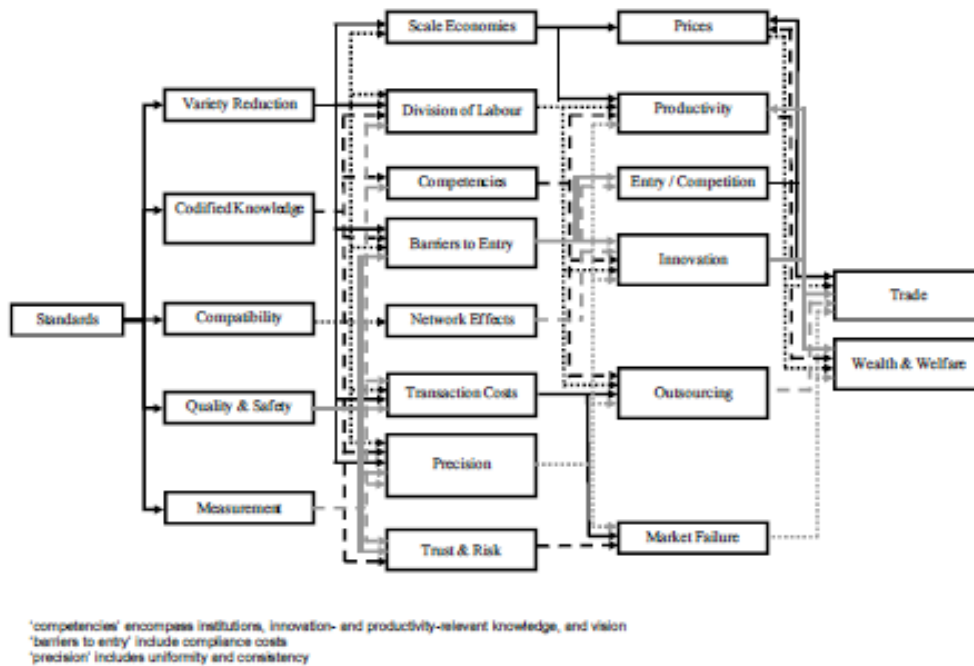
Research design: Non-systematic review. Inclusion criteria are econometric studies that estimate the effect of standards and/or regulations in country X on (i) *exports* from X or (ii) *imports* into X. The review *excludes* work related to SPS standards which is covered by other reviews. It also excludes work on the impact of standards on services trade, which has a limited literature. The resulting sample is 21 studies.

Key findings:

- **Barrier or catalyst:** A key finding of the review is that “there is no single answer to the question” of whether standards help or hinder trade (p. 4). Broadly, the review finds that most studies report a positive relationship between standard adoption in country X and exports from X. However, the effect of standard adoption on imports into a country varies by trading partner and sector. Three studies find that the adoption of standards by a developed economy increase imports from other developed economies but reduce imports from developing economies. Four studies that explicitly model the impact of developed country standards on developing country trade also find a negative relationship. *There is also evidence that adoption of standards (particularly national standards) in the agricultural and textiles sectors restrict imports to a greater extent than other sectors.*
- **Causal pathways:** The diversity of study results suggest that there are multiple causal pathways connecting standards to trade performance (p.5). The review provides a representation of theorised pathways. A full explanation of these linkages is provided on pp.38-42.

³ When assessing the quality of secondary research evidence, this review follows the guidance in DFID (2014) *How to note: Assessing the Strength of Evidence*. Secondary evidence is considered high quality if it is (i) rigorous (i.e. takes a systematic approach to identifying, screening and assessing evidence) and (ii) replicable/transparent (i.e. provides full information on data sources). If it is either rigorous or transparent, it is considered medium quality.

Figure 4. Inside the Standards–Trade ‘Black Box’



- **Policy recommendations:** Not discussed.

Treatment of standards: Though the review is interested in the relationship between standards and trade, it also includes literature on regulations. This is because (i) the empirical literature is limited and including studies on regulations increases sample size; (ii) the economic effects are likely similar, since “so-called ‘voluntary’ standards are not *really* voluntary” as there are usually commercial imperatives to comply; and (iii) much of the literature does not separate the effects of standards and regulations (p. 7). However, it finds that studies investigating the impact of regulations (or regulations and standards) on imports record a negative effect more frequently.

Assessment of literature: The review finds that the size of the empirical literature is increasing: “Until about five years ago, the econometric literature on standards and trade was very limited, but it has grown rapidly in the last few years” (p.7). However, evidence on the causal pathways by which standards effect trade remains a *gap*: “Econometric models represent, at best, ‘black boxes’ that disguise a complex of relationships [between standards and trade] ... a priority for future research must be to open up the ‘black box’ and to gather empirical evidence on all the linkages within Figure 4” (p.38). This will allow a better understanding of the *contexts* in which standards help or hinder trade.

Quality: High.

WTO (2012). World Trade Report 2012. Trade and public policies: A closer look at non-tariff measures in the 21st century.

https://www.wto.org/english/res_e/booksp_e/anrep_e/world_trade_report12_e.pdf

Research question: What is the incidence, role and effects of NTMs and services measures? Sub-questions include, inter alia, what are the trade effects of NTMs, particularly TBT and SPS measures, across countries, sectors and firms?

Research design: Non-systematic review.

Key findings:

- **Barrier or catalyst:** Recent studies based on disaggregated trade data demonstrate that the effect of standards on trade varies across sectors, countries and firms (pp.143-6; 152-3).

Several cross-country econometric studies find that the impact of standards on trade disaggregated by sector is negative for agriculture and food products but positive for manufacturing, particularly technologically-advanced sectors. This result is robust for different types of standard such as environmental regulations.

Additionally, there is increasing evidence that the negative effects of TBT/ SPS measures on trade are concentrated in *developing country exports* to developed countries. However, there is wide variation across developing countries. Exports from smaller developing countries and from Latin, Caribbean and Pacific countries appear most negatively affected by standards adopted by importers.

Finally, there is some limited evidence on the impact of standards on *firms'* export decisions. Initial research points to TBT/ SPS measures being particularly trade restrictive for smaller firms and firms that rely on imported inputs. Both are less able to adapt their production to meet new standards in destination markets and therefore they exit the market or reduce their volume of trade.

- **Causal pathways:**
 - i. *Compliance and/or conformity assessment costs.* The review finds evidence that *differences in conformity assessment costs across sectors and countries may explain some of the variation in the impact of standards on trade* (pp. 147-9). Early research, mainly surveys and case studies, illustrates that conformity assessment costs are perceived as barriers to trade by developing country firms, particularly those in the agricultural sector. More recent studies attempt to quantify the impact of conformity assessment costs relative to other standards-related costs. Fassarella et al. (2011) find that the impact of aggregated TBT/SPS measures on Brazilian poultry exports is insignificant. However, when the measures are disaggregated, conformity assessment costs have a negative and significant impact on export volumes, while packaging and labelling requirements and/ or disease prevention measures promote trade. The World Trade Report authors' own analysis supports this finding. Using the WTO's Specific Trade Concerns Database, which records SPS- and TBT-related complaints, they find that firms which raise conformity assessment concerns are most likely to exit a given export market.
 - ii. *Harmonisation/ mutual recognition.* The empirical literature finds that standards harmonisation and mutual recognition generally increase trade. Additionally, harmonisation is shown to enhance the presence of small and medium-sized firms in export markets. However, if harmonization or mutual recognition occurs within regional trade agreements, there may be significant trade-diverting effects on countries outside the agreement. This appears to be especially the case for developing countries.
- **Policy recommendations:** Not discussed explicitly.

Treatment of standards: The review does not separate the impact of standards from the impact of regulations on trade. This is because "economic theory and associated empirical research, in general, do not distinguish between mandatory and non-mandatory TBT/SPS measures" (p.143). Nor does it separate the impact of public standards from the impact of private standards.

Assessment of literature: The review finds that the *quality* of the literature suffers from a reliance on econometrics-based methods, which have the following shortcomings: (i) a lack of

accurate cross-country measures of standards, which leads to biased estimates; (ii) a tendency to use *aggregate* measures of standards (e.g. the number of standards applied in a country), which means they fail to disentangle the individual effects of different standards (see WTO [2005]); and (iii) a tendency to produce results that are highly sensitive to the econometric techniques used (p.140). Additionally, it notes that theory predicts that standards will affect different firms differently but empirical evidence is absent due to a lack of firm-level data.

Quality: Medium.

Ederington, J. & Ruta, M. (2016). Non-tariff measures and the world trade system. *Policy Research Working Paper, 7661*. World Bank Group.

<http://documents.worldbank.org/curated/en/882991467989523068/pdf/WPS7661.pdf>

Research question: What is the state of the evidence on NTM affecting trade? Sub-questions include, inter alia, what are the trade impacts of particular NTMs (including standards), across sectors, countries and type of firm?

Research design: Non-systematic review. Inclusion criteria are empirical studies on the impact of standards on trade, including TBT and SPS measures of a combination of both. The sample size is 40 studies.

Key findings:

- **Barrier or catalyst:** “The literature finds that the trade impact [of standards] depends on sector, level of development, type of firms, and margin of trade. Specifically, several studies find that standards have a more significant [negative] impact on trade in agriculture relative to manufacturing (Fontagne et al., 2005) on developing countries’ exports relative to developed countries’ (Ederington et al., 2005, Disdier et al., 2008), on small relative to large exporting firms (Reyes, 2011, Fontagne et al., 2015) and on the extensive margin of trade relative to the intensive margin (Fontagne et al., 2015)” (pp. 24-5). This is consistent with the “stylised facts” that NTMs are most prevalent in (i) developed countries and (ii) the agricultural sector (due to the high incidence of sanitary standards), according to data in UNCTAD’s TRAINS database. Manufacturing and intermediate sectors have lower incidences of NTMs.
- **Causal pathways:**
 - i. *Harmonisation/ mutual recognition.* Several empirical papers find that harmonisation and mutual recognition of standards facilitate trade between member countries (Moenius, 2004, Shepherd 2007, Reyes, 2011, Chen & Matoo, 2008). However, this may come at the expense of trade with others: Chen & Matoo (2008) find that harmonisation agreements tend to reduce exports from non-participating countries.
- **Policy recommendations:** Not discussed.

Treatment of standards: The review does not separate the impacts of public and private standards on trade, nor the impacts of standards and regulations on trade.

Assessment of literature: The review comments on the *size* and *quality* of the literature on trade and standards. It finds that “A large body of the literature has dealt with the trade effects of behind-the-border measures, notably standards such as TBT and SPS measures or a combination of both” (p.24). However, this literature suffers from “non-trivial conceptual problems” which undermine its quality (p.4). The literature can be divided into two types of study, those which examine the effect of specific standards (e.g. maximum residue limits) and those which examine the effect of aggregate measures of standards on a country/ industry’s trade. The

latter usually suffers from significant measurement inaccuracies due to the difficulties of aggregating qualitative, heterogeneous standards into a summary index. Thus, more recent research focuses on specific standards which resolves some of these measurement issues but reduces the external validity of findings. In other words, “it becomes difficult to see the big picture” (p.25).

Research quality: High.

Developing countries only

UNCTAD. (2013). Non-tariff measures: review of the empirical evidence from case studies. In UNCTAD, *Non-Tariff Measures to Trade: Economic and Policy Issues for Developing Countries* (pp. 27-36). Geneva: United Nations Publishing.

http://unctad.org/en/PublicationsLibrary/ditctab20121_en.pdf

(Also retrieved from <http://www.standardsfacility.org>)

Research question: What are the implications of NTMs for developing countries? Sub-questions include, inter alia, what is the state of the evidence on the effect of SPS measures and TBT on developing country trade and welfare?

Research design: Non-systematic review. Inclusion criteria are studies that examine the impact of SPS measures and TBT on developing country trade outcomes, including export *volumes* and export *diversification*.

Key findings:

- **Barrier or catalyst:** Both. Research exploring the effect of similar SPS measures and TBTs on developing country trade reach diverse conclusions, as illustrated by the following three studies. Using a gravity model, Otsuki et al. (2001) analyse the effect of EU aflatoxin standards on selected African exports and find a significant negative impact for cereals, dried fruits and nuts. Gebrehiewt et al. (2007) conduct a similar analysis of aflatoxin standards in selected OECD countries on South African food exports and also find a negative effect. However, Xiong and Beghin (2010) find that the EU’s decision to tighten aflatoxin standards in 2002 had no significant effect on African exports of groundnuts, and conclude that the trade potential of African groundnut producers is more constrained by domestic supply issues than standards.
- **Causal pathways:** While the review does not attempt to explain the differing results of the studies on aflatoxin standards, it presents evidence on various hypothesised causal pathways by which standards impact developing country trade.
 - i. *Harmonisation/ mutual recognition.* Czubala et al. (2009) compare the impact of international standards and EU-specific standards on African textile exports to EU markets. They find that the application of harmonised international standards by EU markets is less restrictive of African trade. However, other studies have caveated this finding. Wilson et al. (2003) estimate that worldwide implementation of international standards in the beef sector would increase beef exports from emerging economies, but decrease exports from low-income countries that currently only export to markets applying lax national standards. Meanwhile, regional or bilateral harmonisation has been found to impede export diversification into new markets for participating developing countries (Disdier et al. [2012], Shepherd [2007])

- ii. *Information provision.* Standards enhance trade when they reduce information asymmetries between exporters and importers, and these benefits outweigh the costs of compliance (see World Bank [2005]). Thus, Moenius (2004) argues that *standards have positive trade effects in manufacturing sectors, particularly technologically advanced sectors*. Based on a cross-country econometric analysis, he finds that standards reduce agricultural trade but promote trade in manufacturing, on average. He argues that this is because manufacturing industries suffer from greater informational asymmetries due to products' higher technological content and diversity. On the other hand, agricultural products are largely homogenous. Fassarella et al.'s (2011) study of Brazilian poultry exports similarly find that labelling promotes trade.
 - iii. *Compliance and/ or conformity assessment costs.* Chen et al. (2006) analyse how foreign standards and technical regulations affect the export decisions of firms. They find that testing procedures and lengthy inspection processes have an adverse effect on developing country firms' propensity to export, and this effect is larger for agricultural firms which produce perishable goods. Chen et al. (2008) similarly find that certification procedures are associated with a significant decline in developing country firms' export volumes and export diversification into new markets, while quality standards are positively correlated with both.
 - iv. *Capacity and supply-side constraints.* Meeting SPS standards or overcoming TBTs often requires long-term investments that are not available to many developing country firms, particularly smaller ones.
- **Policy recommendations:** Not discussed explicitly.

Treatment of standards: The review does not separate the impacts of public and private standards on trade, nor the impact of standards and regulations on trade.

Assessment of literature: The review comments on *key features* of the literature: "most analyses exploring the effect of SPS measures and TBTs on trade investigate the impact of those measures in terms of additional costs (marginal and fixed), trade, or in relation to harmonization of standards (in a bilateral or multilateral context). In terms of scope, most studies focus on a few economic sectors and very specific types of restrictions (e.g. maximum residue limits, labelling, conformity assessments, etc.). With regard to the empirical approach, the majority of studies of SPS measures and TBTs generally rely on econometric estimations, often in the form of gravity models" (p.28).

Quality: High.

Kaplinksy, R. & Morris, M. (2017). Do Regulations and Standards Support Sustainability Dynamics in Global Value Chains? *Bridges Africa* 6(7), pp.4-7. Geneva: ICTSD.⁴
<https://www.ictsd.org/bridges-news/bridges-africa/issue-archive/spotlight-on-sustainability-standards>

⁴ This article provides a detailed summary of Kaplinksy & Morris' forthcoming research on standards and value chains. Therefore, the following information is based on the summary, not the full research report.

Research question: What is the impact of *sustainability* regulations and standards on (i) achieving the Sustainable Development Goals (SDGs) and (ii) low- and middle-income country producers' inclusion in GVCs?

Research design: Non-systematic review. Inclusion criteria are case studies examining “the role of regulations and standards in GVCs/ SDGs” with a particular focus on low- and middle-income countries in Africa, Asia and Latin America. Included case studies cover the following sectors: fresh fruit and vegetables, wine, fish, apparel, organics, handicrafts, leather products, the marine sector and electronics.

Key findings:

- **Barrier or catalyst:** Both. Standards compliance *can* promote inclusion in GVCs, resulting in higher wages, better working conditions and improved environmental outcomes. However, there is evidence that standards can also *exclude* certain developing country producers from GVCs. In particular, standards exclude “small producers, small farms, women, and older producers” (p.6).
- **Causal pathways:** There are three main obstacles for disadvantaged producers in meeting standards:
 - i. *Compliance and/or conformity assessment costs.* The costs of achieving the necessary certification can exclude disadvantaged producers.
 - ii. *Capacity and supply-side constraints.* Disadvantaged producers lack skills required for standards compliance, such as illiteracy, innumeracy, and lack of new management skills.
 - iii. *Availability of information on standards/ markets.* Disadvantaged producers often lack knowledge/ awareness about standards.
- **Policy Recommendations:** “Policy actors need to correct for market failures which limit the capabilities of producers to meet standards and regulations” (p6). This includes filling information gaps, financing certification costs and assisting producers to develop upgrading capabilities to meet standards. “There is a particular need to assist the capacities of poor and marginalised producers (such as women, small producers, and distant producers)” (pp. 6-7).

Treatment of standards: The report distinguishes between public and private standards, but conflates public standards with regulations: “Regulations affecting market entry are adopted by governments, including through intergovernmental agreements and are binary in nature: automatic exclusion flows from non-compliance. Standards are set by non-state actors and provide more flexibility for supplier firms in meeting them” (p.5). It does not separate the impact of standards and regulations on developing country firms.

Assessment of literature: The review briefly references the *size* of the literature: “there is considerable evidence that meeting standards and regulations in GVCs contributes to the achievement of many of the SDGs... but, at the same time, the very same achievement of standards can be exclusionary in character, and often shut out the least advantaged producers” (p.6).

Research quality: Medium.

Wickerham, J. & D'Hollander, D. (2017) New Models for Increasing Producer Benefits Through Sustainability Standards and Trade on Africa? *Bridges Africa* 6(7), pp.8-11. Geneva: ICTSD.

<https://www.ictsd.org/bridges-news/bridges-africa/issue-archive/spotlight-on-sustainability-standards>

Research question: How can sustainability standards in Africa foster new value chains?

Research design: Non-systematic review.

Key findings:

- **Barrier or catalyst:** Barrier. “African producers have difficulty in using sustainability standards to their advantage and fully capitalising on the rising demand for sustainably-produced goods and products” (p.9). Exceptions include the West African cocoa producing countries where standards systems such as UTZ, Fairtrade and organic have a long-standing presence. The use of Fairtrade standards in coffee, tea and other crops has also been growing.
- **Causal pathways:**
 - i. *Capacity and supply-side constraints.* African producers lack of access to credit (due, inter alia, to lack of property rights) for implementing sustainable practices and undergoing assessment;
 - ii. *Lack of information on standards/ markets.* A lack of clarity on consistent, long-term demand for sustainable products prevents producers from assessing the potential returns on investment.
- **Policy Recommendations:** New partnerships between African country governments and producers are required to build local capacity to meet standards, and also ensure producers better understand demand in consumer markets. Additionally, trade-related instruments in developed countries, including Generalised System of Preferences (GSP) and aid-for-trade, can be used to foster more sustainable value chains. GSP frameworks could offer preferential access to sectors/ firms using credible standards systems, while aid-for-trade and other development assistance can support producers to implement them.

Treatment of standards: Report focuses on “*voluntary* sustainability standards” defined as “criteria and requirements [that] are linked to one or more of the 17 SDGs and often connect to various other international sustainability agendas” (p.8). It does not distinguish between public and private standards and their different impacts on developing country producers.

Assessment of literature: Not discussed.

Research quality: Medium.

Redden, J. (2017). *The Role of Aid for Trade in Building the Capacity of Developing Country Firms to Meet Sustainability Standards*. Geneva: ICTSD.

<https://www.ictsd.org/themes/development-and-lDCs/research/the-role-of-aid-for-trade-in-building-the-capacity-of>

Research question: Why are SMEs unable to comply with standards required by GVCs? How can Aid-for-Trade (AfT) support SMEs to comply with these standards?

Note: This research follows from Kaplinsky and Morris’ (2017) finding that sustainability standards exclude small suppliers from GVCs.

Research design: Non-systematic review. Includes evidence from surveys, consultations and cases studies of developing country SMEs in agricultural, fisheries, light manufacturing (including textile and clothing) and services sectors

Key findings:

- **Barrier or catalyst:** Both. There has been exponential growth in the number of sustainability standards and regulations and compliance is unavoidable for developing country SMEs wishing to enter GVCs and access major markets. Standards are a barrier for those firms unable to comply, but a catalyst for those that can. Small-scale, informal and women SMEs are less able to comply.
- **Causal pathways:** Key reasons why some SMEs are unable to meet standards are:
 - i. *Availability of information on standards/ markets.* One of the most common needs identified by SMEs and small producers is access to information about the various standards required for GVC compliance. E.g. women's textile SMEs from Cambodia, Sri Lanka, Mauritius and Bangladesh all highlighted specific difficulties in obtaining the appropriate information not only about the actual sustainability standard required but, in some cases, the necessary production process or type of testing required to meet the standard. A related issue concerns accessing information on the market access opportunities afforded by different standards.
 - ii. *Compliance and/or conformity assessment costs.* The cost of standards compliance, which may involve certification, the purchase of infrastructure, the cost of laboratory testing, packaging and labelling, the cost of membership to a relevant institution or the training of staff, may be trivial for larger firms but can be a major obstacle for SMEs. If conformity assessment procedures are lengthy, this adds further costs.
 - iii. *Capacity and supply-side constraints.* Access to quality, trade-related infrastructure is cited by numerous SMEs as a vital barrier for meeting sustainability standards. Additionally, a lack of access to human resource skills and expertise both within and outside of SMEs is a barrier.
- **Policy recommendation:** AfT programmes should specifically target vulnerable SMEs which are often unaware or unable to afford compliance. Evidence suggests that while AfT programmes in support of compliance will differ across sectors, there are a number of cross-cutting areas in common. They include the importance of targeted training and capacity-building programmes for SMEs, the vital role of appropriate quality infrastructure, capital equipment and related servicing requirements, a strong emphasis on gender and poverty analysis of value chains, and they stress the importance of local ownership and market access, including through the leveraging of free trade agreements.

Treatment of standards: The review offers the following typology of sustainability standards: corporate standards specified by the lead, buying firm in the GVC; generic standards that are industry specific or relevant across a range of sectors (eg ISO 9000), standards set by government and standards designed by civil society. However, it does not separate the impact of public and private standards on developing country SMEs, nor the impact of standards and regulations on trade.

Assessment of literature: Not discussed.

Research quality: Medium.

Meliado, F. (2017). *Private Standards Trade, and Sustainable Development: Policy Options for Collective Action.* Geneva: ICTSD.

Research question: How can the global governance of *private* standards be improved to address the unfair exclusion of smaller developing country suppliers from GVCs?

Research design: Non-systematic review that includes factual and conceptual studies “as informed by discussions with experts” (p.viii).

Key findings:

- **Barrier or catalyst:** Both. Compliance with private standards is an enabler of GVC participation, which in turn helps secure new export market opportunities. Non-compliance excludes potential suppliers, usually smaller firms/ producers, from GVCs.
- **Causal pathways.** The review identifies four ways in which private standards prevent certain SMEs from accessing GVCs:
 - i. *Lack of information on standards/ markets.* Lack of transparency appears as a key failure in the operation of several private standard schemes. SMEs lack access to information relating to compliance requirements and conformity assessment techniques for private standards, as well as to standard development processes.
 - ii. *Harmonisation/ mutual recognition.* Lack of harmonisation across private standards schemes inhibit SME participation in multiple value chains. Scheme requirements are reportedly often misaligned both with each other, and in relation to regulatory requirements in one or multiple jurisdictions.
 - iii. *Lack of (credible) conformity assessment infrastructure.* Private standard schemes often lack credibility, which may deter compliance. The credibility of private standard schemes is a function of their scientific justification and the reliability of their conformity assessment procedures.
 - iv. *Deliberate protectionism.* Buyers downstream in the GVC may design private standards to limit competition and exclude smaller producers.

Note, the review finds that *capacity and supply-side constraints* is *not* a causal pathway by which standards exclude SMEs from GVCs. Low capacity SMEs are usually already excluded from GVCs before the introduction of standards.

- **Policy recommendations:** The review provides options for improving the governance of private standards at the WTO-level (options 1–3) and outside of it (options 4–5):
 - i. Create a joint SPS/TBT transparency mechanism for private standards;
 - ii. Establish a public–private cross-pollination mechanism under the Agreement on Government Procurement
 - iii. Launching a work programme on sustainability-related public–private partnerships within the framework of the Trade Facilitation Agreement;
 - iv. Expanding the work programme of the United Nations Forum on Sustainability Standards, so as to officially include international, regional, and national standards bodies;
 - v. Using the United Nations Global Compact to promote transparency and accountability principles.

Treatment of standards: The review recognises that there is terminological confusion with regard to the differences between private, public, voluntary, mandatory, and regulatory standards in the literature. It only reviews the evidence related to *private* standards.

Assessment of literature. The review comments on the *size* of the literature on standards and developing country GVC participation: “an ever-increasing body of literature” has documented that the “proliferation of private standards worldwide has created both new opportunities and (additional) constraints on the ability of developing country producers ... to integrate into international supply chains” (pp.12-13). However, evidence on causal pathways remains a *gap*: there is a “need for dedicated research” to understand the factors that hinder some firms from participating in GVCs due to standards (p.13).

Quality: Medium.

4. Secondary research evidence: single sector studies

Agriculture and food products

Swinnen, J. & Maertens, M. (2009). Standards, Trade and Developing Countries. In G. Porto & B. M. Hoekman (Eds.), *Trade Adjustment Costs in Developing Countries: Impacts, Determinants and Policy Responses* (pp.331-344). Washington DC: World Bank.

http://siteresources.worldbank.org/INTRANETTRADE/Resources/239054-1239120299171/5998577-1244842549684/6205205-1247069686974/Trade_Adjustment_Costs.pdf

Research question: What is the empirical evidence on the implications of increasing food standards for (i) developing country food exports and (ii) poverty alleviation? Are food standards “barriers or catalysts to trade?” (p.350)

Research design: Non-systematic review.

Key findings:

- **Barrier or catalyst:** Both. “The main conclusion is that increasing and tightening food standards may be both barriers and catalysts for the participation of poor countries in international agricultural trade and for development in these countries” (p.339).
- **Causal pathways:** The paper finds (limited) empirical evidence in support of a number of causal pathways between standards and developing country trade.
 - i. *Deliberate protectionism.* Standards may be used as protectionist tools by importing countries, e.g. through non-enforcement of compliance for domestic producers. There are anecdotal examples to support this causal pathway, but little systematic evidence.
 - ii. *Compliance and/or conformity assessment costs.* Standards may act as barriers to developing country trade because of the high costs of compliance and certification. The empirical evidence on this issue is “limited and mixed” (p.334). Some authors find evidence of high compliance costs while other studies have estimated that these costs are only a small fraction of total of food production costs and concluded that compliance is less costly than generally assumed.
 - iii. *Capacity and supply-side constraints.* The high incidence of border detentions of developing country exports by developed countries may indicate a lack of capacity for developing country producers to comply with standards. For example, in January-May 1999, the US Food and Drug Administration reported 3000 border detentions of

imported fruits and vegetables and more than 1500 detentions of fishery products, mostly from developed countries.

- iv. *Information provision.* When standards increase transparency, they reduce transaction costs, promote consumer confidence and increase developing countries' access to international markets, thus catalysing trade. Henson and Jaffe (2008) find evidence of this causal pathway.
- v. *Export competitiveness.* Standards may improve competitiveness by catalysing developing country firms into upgrading their food supply systems. This occurs when developing country governments are "proactive in food quality and safety and facilitating business strategic responses" to standards (p.335).

- **Policy recommendations:** Not discussed.

Treatment of standards: The review only includes evidence on food standards, defined as "regulations and requirements from national and international governments as well as from private actors and with standards focusing on different issues such as product quality, food safety, and increasingly also ethical and environmental concerns" (p.331). The review does not separate the impact of standards from regulations, nor the impact of public and private standards.

Assessment of literature: The review comments on the *consistency* of the literature on food standards and developing country trade. Standards are often seen as barriers to agricultural trade for poor countries in the theoretical literature. However, the empirical literature has come to "diverse conclusions" on the relationship between standards and trade (p.333).

Quality: Medium.

Moisé, E., Delpeuch, C., Sorescu, S., Bottini, N. & Foch, A. (2013). Estimating the Constraints to Agricultural Trade of Developing Countries. OECD Trade Policy Papers, No. 142. Paris: OECD.

http://www.oecd-ilibrary.org/trade/estimating-the-constraints-to-agricultural-trade-of-developing-countries_5k4c9kwfdx8r-en

(Also retrieved from <http://www.standardsfacility.org>)

Research question: What kind of constraints restrict developing countries' agricultural exports and why? Sub-questions include, inter alia, what are the impact of standards on developing countries' agricultural exports?

Research design: Non-systematic review; observational, mixed methods (econometric analysis; case studies).

Inclusion criteria for the non-systematic review are empirical literature on constraints to developing countries' agricultural exports, including literature on the impact of standards. The econometric analysis regresses agriculture trade on various identified constraints in order to identify the most important. However, a paucity of data on the prevalence and stringency of standards across countries disallows their inclusion in the econometric analysis. Instead, a case study of Indonesia's agro-food sector is employed to illustrate how standards may affect agricultural trade performance.

Key findings:

- **Barrier or catalyst:** The non-systematic review finds that: "The recent economic literature on standards suggests that while stronger or more harmonised standards are clearly associated

with increased trade in manufacturing..., this is less clear-cut in the case of agricultural trade” (p.15). The review finds evidence that standards are a greater barrier to exports for low-income developing countries and smallholder farmers/ SMEs. Moreover, voluntary *private* standards, which have become the “de facto entry requirement for trade” in many sub-sectors, usually have a larger scope, require higher levels of performance and evolve more rapidly than baseline public regulations, constituting even greater barriers to trade (p.16)

The case study of Indonesia’s agro-food sector finds that an increase in public and private standards applied in foreign markets has limited export potential. In particular, the share of Indonesia’s agro-food exports destined to key advanced economies (the EU, the US and Japan) fell from 54% in 2000 to 32% in 2010 due mainly to producers’ inability to conform to standards and/or gain certification. This decline was not offset by a reduction in the EU’s average applied tariffs to agricultural products from Indonesia over this period.

- **Causal pathways:** The non-systematic review finds that the literature has identified several pathways by which standards impede agricultural exports in developing countries’. These include:
 - i. *Compliance and/or conformity assessment costs.* In some market segments, the price differential between high and low quality products does not compensate producers for the high costs of compliance. Compliance costs include testing and accreditation services (including transport to access these services); investment in new processes, infrastructure and skills; and collecting information on applicable standards. These costs are higher for smaller producers that lack access to inputs and economies of scale, explaining why standards may have a disproportionate impact on their export opportunities, pushing them “upstream” in supply chains or marginalising them all together from regional and national markets.
 - ii. *Availability of (credible) conformity assessment infrastructure.* Effective standards systems must be responsive to international demand, adapted to local circumstances and effectively enforced. Developing countries’ relevant agencies often lack adequate expertise, resources (including equipment) and incentives to deliver these systems.
 - iii. *Harmonisation/ mutual recognition.* Differences among agricultural standards applied by importing countries can further limit developing countries’ export opportunities. This issue is most acute among African and Asian regions, which lack regionally harmonised SPS and food safety standards. For example, a World Bank report on Africa’s intra-regional trade found “food producing companies in Kenya often find it easier to meet the strict technical regulations for exporting to the Japanese, European, or Singapore markets, than the widely diverging and poorly administered regulations in other African countries” (p. 16). However, even among developed countries, there are important differences among standards applied in areas such as aflatoxin content or pesticide residues.

The Indonesian case study corroborates the causal pathways identified in the literature. High costs in implementing foreign standards; insufficient testing, certification and enforcement capacity among supervising authorities; and variations in applied standards across importing countries all act as barriers to trade.

- **Policy recommendations:** Both the government of Indonesia and donors have undertaken interventions to support agro-food producers to implement and certify compliance with international standards. The government has rationalised the testing and certification sector, banned the use of certain inputs to production, implemented information campaigns on foreign standards compliance and provided direct capacity building support to firms. The

main donor intervention has been the EC's Trade Support Program, which has targeted some of the shortfalls of government policy, particularly improving harmonisation of national and international standards. Thus, the "case study illustrates the wide range of actions that may be required" to support developing country producers to comply with international standards (p. 48). Such a holistic approach requires "long-term commitment, and sufficient planning and delivery time" (p. 48).

Treatment of standards: The research (briefly) discusses the differential impact of public and private standards on developing countries' export opportunities (see above). However, it does not separate the impact of public standards from regulations.

Assessment of literature: Not discussed.

Quality: High.

Unnevehr, L. & Ronchi, L. (2014). Food Safety Standards: Economic & Market Impacts in Developing Countries. *Public Policy Journal*, No. 341. World Bank Group.

http://www.standardsfacility.org/sites/default/files/VIEWPOINT_Food_Safety_FINAL_PUBLISHED.pdf

Research question: What is the evidence regarding the economic and market impacts of compliance with (1) public food safety standards; (2) private food safety standards; and (3) the impact of technical assistance in facilitating compliance?

Research design: Non-systematic review. Includes 17 empirical studies.

Key findings:

- **Barrier or catalyst:** *Public food safety standards* in high-income countries tend to act as barriers to developing country food exports. Studies find that non-compliance by developing country firms leads to loss of export markets, while compliance frequently increases costs substantially, thus reducing exports at the margin. *Private food safety standards* may act as barriers or catalysts to developing country exports. Compliance with private standards tends to increase firms' export sales and prices, which has further welfare benefits such as higher income. Non-compliance has the opposite trade effect because firms are excluded from export markets (though the impact on welfare is mixed).

Interestingly, the review finds mixed evidence that private standards act as a greater barrier to small firms. A study of export supply chains in Peru's asparagus sector found that stringent standards led to exclusion of smallholders, but studies in Zimbabwe, Chile, Thailand and India found that smallholders were able to adapt to new food safety standards because the scale advantages of larger farms were modest and transaction costs in supply chains declined over time.

- **Causal pathways:** The review highlights the importance of *capacity and supply-side constraints* in determining which producers turn standards to their benefit. Levels of education/ experience, gender, membership in a farmer association and access to technical support may be the most important determinants of suppliers' ability to comply with food safety standards. Six studies that tested explicitly for the impact of (donor) technical assistance found positive impacts in facilitating standards compliance and market participation, though two also found that the sustainability of this impact was reduced by donor short-termism.

- **Policy recommendations:** Public-private partnerships to support supplier compliance may be more effective than public assistance. Private buyers down-stream in the supply chain have a continued economic motivation to support supplier compliance, as well as industry knowledge. These approaches have not yet been explored in the literature.

Treatment of standards: The review separates the impact of public standards from private standards, but does not separate the impact of public standards from public regulations.

Assessment of literature: The review comments on the *size* and *consistency* of the literature: “compliance with private food safety standards produces clear benefits just as market exclusion resulting from non-compliance imposes costs. These effects are now well-documented in the literature”. It also notes that there is a growing body of evidence documenting the welfare effects of standards compliance, as well as the role of technical assistance in supporting standards compliance. It also comments on the *context* of the literature: “Most of the literature, however, has been focused on the relatively small market for EU horticultural products, which will provide opportunities for only a fraction of developing country producers.” It concludes that the impact of food safety standards on South-South trade is a gap in the literature.

Research quality: High.

Keiichiro, H., Otsuki, T. & Wilson, J. (2015). Food Safety Standards and International Trade: The Impact on Developing Countries’ Export Performance. In A. Hammoudi, C. Grazia, Y. Surrey, J-P Traversac (Eds.) Food Safety, Market Organization, Trade and Development. Switzerland: Springer International Publishing. *

Research question: What is the state of the evidence on the impact of food safety standards on food and agricultural exports? The review has a “particular focus on developing countries as exporters” (p. 153).

Research design: Non-systematic review. Inclusion criteria are studies that *quantify* the impact of food safety standards on trade outcomes at either the country-level or the firm-level.

Key findings:

- **Barrier or catalyst:** Barrier. Country-level studies generally find a *negative* impact of importers’ food safety standards on food and agricultural exports, and this negative effect is more prominent for developing countries. However, the significance and magnitude of this effect varies across product categories: foods safety standards seem to pose a greater barrier to exports in the cereals and fruit and vegetables sub-sectors than in the nuts sub-sector. Additionally, there is evidence that food exports from low-income and African countries are more sensitive to tightened importer’s standards.

Firm-level studies are fewer due to a lack of data. However, they generally confirm that food safety standards impose direct/ indirect and one-time/ recurring costs on exporting firms in developing countries which reduce trade volumes. Nevertheless, some do find that the demand-enhancing outcome of compliance with food safety standards counteract the negative supply-side effects of increased costs, thus increasing the average firms’ exports on the extensive and intensive margin.

- **Causal pathways:** *Compliance and/or conformity assessment costs.* The evidence suggests that the costs required to comply with food safety standards is greater for developing country exporters than developed country exporters. These costs tend to outweigh the demand-enhancing effect of standards such that the net effect on developing country trade is

negative. The likely reason for this is that importers' food safety standards are more stringent than or otherwise dissimilar from developing countries' standards, requiring costly investment from developing country producers.

- **Policy recommendations:** The review "highlights the importance of a concerted effort between developed and developing countries to reduce the trade-cost effect and to leverage the demand-enhancing effect [of food safety standards]. Such an effort would include setting reasonable levels of food safety standards as well as raising the capacity of exporting firms" in developing countries (pp.151-2)

Treatment of standards: The review only includes evidence related to food safety standards, mostly maximum residue limits of antibiotics/ pesticides. The review does not separate the impact of food safety standards from food safety regulations, nor the impact of public and private standards.

Assessment of literature: The review references the growing *size* of the literature on food safety standards and trade. Most of these are country-level studies which illustrate how food safety standards affect total exports of a particular country/ product. There are fewer firm-level studies examining how firms' exports react to food safety standards and which factors affect their reaction. The *quality* of the evidence has also improved. Though there remains a reliance on econometric methods, sources of bias in earlier models have been corrected in the recent research (see p.155 for more details).

Research quality: Medium.

5. Primary research evidence: multi-sector studies

Basu, S.R., Kuwahara, H. & Dumesnil, F. (2012). Evolution of non-tariff measures: Emerging Cases from Selected Developing Countries. *Policy Issues in International Trade and Commodities*, No. 52.

http://www.standardsfacility.org/sites/default/files/Evolution_of_NTM.pdf

Research question: To what extent are firms' affected by non-tariff barriers in selected developing countries? Which type of NTMs most affect firms'? In which sectors are firms most affected?

Research design: Observational, qualitative (interview survey). Interview data from 2000 small- and medium-sized firms in seven developing countries (Brazil, Chile, India, the Philippines, Thailand, Tunisia and Uganda) is analysed. The sampling methodology targeted firms in sectors that were recognized a priori as facing more stringent NTMs, or sectors that were considered as significant in terms of exports based on their shares in a country's total exports.

Key findings:

- **Barrier or catalyst:** The survey only collected data on (non-tariff) *barriers* to exports. Of total export-related barriers reported by firms, 51% were technical barriers to trade and 34% were SPS-related barriers to trade (price-controls, quantity controls, rules of origin and other measures constituted the remaining 15%).

The sectors most affected varied significantly by country. In Tunisia and India, over 80% of reported non-tariff barriers to exports related to manufactured products, particularly textiles, machinery and chemical products. However, in Chile, the majority of reported non-tariff barriers were in the agricultural sector, with vegetable exports being particularly affected. The

other countries had a roughly even proportion of reported non-tariff barriers to exports in agriculture and manufacturing.

- **Causal pathways:** *Compliance and/or conformity assessment costs:* Labelling and packaging requirements, and compliance assessment (for example, certification, testing and inspection) were the most commonly cited standards-related barriers to exports.
- **Policy recommendations:** Not discussed

Treatment of standards: The research does not separate the impact of standards from regulations, nor the impact of public and private standards.

Assessment of literature: Not discussed.

Quality:⁵ High

6. Primary research evidence: single sector studies

Agriculture and food products

Disdier, A., Fekadu, B., Murillo, C., & Wong, S. (2008) *Trade Effects of SPS and TBT Measures on Tropical and Diversification Products*. Geneva: ICTSD.

https://www.ictsd.org/downloads/2008/05/disdier_issuepaperno12.pdf

Research question: What are the trade effects of SPS measures and TBTs on tropical and diversification products?⁶ Specifically, to what extent and for what products do SPS and technical requirements under public law represent barriers for exports of tropical and diversification products to enter developed countries' markets, namely the EU, the US, Japan, Canada, Australia and Switzerland?

Research design: Observational, mixed methods (case studies, econometric analysis).

Key findings:

- **Barrier or catalyst:** The econometric analysis uses a gravity equation to estimate the impact of standards on exports of tropical and diversification products at the *country-level*. It finds strong differences across developing countries. African, Caribbean and Pacific countries are the most negatively affected by standards, both in terms of the number of products and the magnitude of the trade effect. Standards also have a significant negative impact on exports from Latin American countries, but not on Asian exports.

The case studies examine the impact of standards on tropical and diversification exports at *the firm-level*. They find differences across types of firm. Larger businesses are better able to comply with standards, which in turn improves their competitiveness and ability to access international markets. Smaller businesses are less able to comply with standards leading to trade losses.

⁵ When assessing the quality of secondary research evidence, this review follows the guidance in DFID (2014) *How to note: Assessing the Strength of Evidence* (pp.11-4)

⁶ Tropical and diversification products have been a special negotiating sector since the Kennedy Round (1964–67). Though there has never been a definitive list of products included in this sector, the study defines 134 tropical agricultural goods as tropical and diversification products (see pp.2-4).

- **Causal pathway:** The case studies find that the obstacles to standards compliance vary depending on the country and product-sector.
 - i. *Compliance and/or conformity assessment costs:* In Ecuador's banana and pineapple sectors, the high costs of complying to an increasing number of SPS and TBT requirements is key.
 - ii. *Harmonisation/ mutual recognition:* In Costa Rica's melon and pineapple sectors, the main obstacle is constant *changes* in the allowed maximum residue level and allowed agrochemicals across countries and over time.
 - iii. *Availability of information on standards/ markets.* In Ethiopia's coffee sector, farmers and exporters frequently *lack knowledge* about SPS and TBT measures.
- **Policy recommendations:**
 - i. Increased support for African, Caribbean and Pacific countries to comply with SPS and TBT standards. Provisions on technical assistance and special and differential treatment included in the WTO's SPS and TBT agreements should be maintained and reinforced in order to help these countries implement and take advantage of the agreements.
 - ii. Increased role for union and government. One solution for medium-sized and small businesses to comply with the most stringent SPS and TBT requirements could be to act in cooperatives. Government's help could also be useful.
 - iii. Reduction in standards variation across countries and over time.
 - iv. Increased role for WTO in ensuring that standards are proportionate to risk, and don't impose unnecessary cost on developing country producers.

Treatment of standards: The econometric analysis uses *public* standards and regulations that have been notified to the WTO by developed countries as its explanatory variable. The focus on public measures is due to the fact that no cross-country database on private standards exists. However, the case study analysis examines the impact of both public and private standards. It notes, "The development of private standards is recent but very rapid, and one can question whether today these standards do not influence trade more than public standards do" (p.xiii). The research does not separate the impact of standards from regulations.

Quality: High.

Jongwanich, J. (2009). Impact of Food Safety Standards on Processed Food Exports from Developing Countries. ADB Economics Working Paper Series, No 154. Manila: Asian Development Bank.

http://www.standardsfacility.org/sites/default/files/ADB_ImpactFoodSafetyStandards.pdf

Research question: What is the impact of food safety standards on processed food exports in developing countries?

Research design: Observational, quantitative (econometric analysis). The value of processed food exports is regressed on a measure of exporters' ability to meet food safety standards, controlling for other determinants of processed food exports such as agricultural endowment, domestic market and various trade policies.⁷ The model is fitted over panel data from 79 developing countries during 1990-2006.

⁷ The measure of exporters' ability to meet food safety standards is the incidence of detention of their processed food exports by importing countries

Key findings:

- **Barrier of catalyst:** Food safety standards imposed by developed countries tend to have a negative implication for processed food exports from developing countries.
- **Causal pathway:** Hypothesised reasons for the negative impact of standards on processed food exports are:
 - i. *Deliberate protectionism:* Developed countries use standards as a protectionist tool, twisting testing and certification procedures to support local producers;
 - ii. *Capacity and supply-side constraints* including lack of access to upgrading production technologies, lack of access to credit and lack of logistics infrastructure.
- **Policy recommendations:** Increased multilateral efforts to provide developing country exporters with financial and technical assistance; increased support from multi-national enterprises to developing country exporters and public investment in agricultural sector upgrading.

Treatment of standards: Implicit focus on *public* food safety standards, defined as “all relevant laws, decrees, regulations, requirements and procedures” (p.6).

Quality: Medium.

Jenssen, M. & Keyser, J. (2012). *Non-tariff barriers and regional standards in the EAC Dairy Sector*. In P. Breton & G. Isik (Eds.) *De-fragmenting Africa: Deepening Regional Trade Integration in Goods and Services* (pp. 105- 111). Washington DC: World Bank.

http://siteresources.worldbank.org/INTAFRICA/Resources/Defrag_Afr_English_web_version.pdf

Research question: How can the development of new standards in the East African Community’s (EAC) dairy industry promote trade and economic development in the region?⁸

Research design: Observational, qualitative (case study)

Key findings:

- **Barrier or catalyst:** Standards have the potential to catalyse intra-regional trade in dairy products in the EAC by facilitating production upgrading and providing quality assurance, thereby stimulating demand. The region’s national governments recently introduced standards for dairy products with the support of a USAID-funded regional trade integration programme. However, the research argues that with the exception of a few large-scale dairy firms, most traders and producers have not implemented them.
- **Causal pathway:** *Harmonisation/ mutual recognition*. The immediate cause for low compliance is that the new standards are based on Codex Alimentarius, which are best-practice international standards. International standards are inappropriate for EAC’s dairy industry. First, many of them apply to products and processes that are uncommon or non-existent in EAC. For example, several standards relate to pasteurized milk even though milk is mostly consumed raw in East Africa. Second, international standards require extensive conformity assessment procedures that are not possible in EAC’s dairy industry, which is predominantly informal. Third, there is low consumer demand for products meeting international standards, which inevitably are higher cost. The root cause is the “top-down’

⁸ The EAC is a regional trading bloc that includes a free trade area, customs union and common market. Burundi, Kenya, Rwanda, South Sudan, Tanzania and Uganda are members of the EAC.

approach to standards design” adopted in East Africa (p.110). The process was dominated by international donors, technical agencies, national governments and large dairy producers. These actors did not consider the economic and technical realities of the sector.

- **Policy recommendations:** East African countries and donors should avoid importing standards designed for OECD countries without adjusting them to the realities in East Africa. These realities include, inter alia, the specific types of products produced and consumed (e.g. raw milk), the dominance of the informal sector and consumer demand for low-cost products. Ensuring standards are appropriate for the context requires a bottom-up, incremental approach to their design.

Treatment of standards: Research focuses on (public) dairy products standards which “specify how dairy products have to be produced, stored, transported and labelled” (p. 21). It does not separate the impact of standards from regulations on (potential) trade.

Research quality: Medium.

Ferro, E., Wilson, J. & Otsuki, T. (2013). The Effect of Product Standards on Agricultural Exports from Developing Countries. *Policy Research Working Paper, 6518*. The World Bank.

<http://www.standardsfacility.org/sites/default/files/WPS6518.pdf>

Research question: What is the impact of importer’s food safety standards on exports entering their markets? Do these effects differ for exports originating in developing or developed countries?

Research design: Observational, quantitative (econometric analysis). A “standards restrictiveness index” is developed for 61 importing countries. Countries are ranked based on the *number* of standards they apply across 66 agricultural products and the “strictness” of those standards in terms of maximum residue limits. Trade flows are regressed on the food standards restrictiveness index using a gravity model.

Key findings:

- **Barrier of catalyst:** More restrictive food safety standards negatively affect exporters’ decision to export to a given destination market. Regional comparisons indicate that the marginal effect of standards of emerging middle-income countries (e.g. the BRIC countries) tends to be greater than that of others although their standards are not the most stringent. It also suggested that exports from low-income countries are more sensitive to tightened importer’s standards than those from higher-income countries.
- **Causal pathway:** Not discussed.
- **Policy recommendations:** Not discussed

Treatment of standards: Does not separate the impact of public standards from private standards, nor the impact of public standards from public regulations.

Assessment of the literature: The study comments on the *quality* of the literature: “studies in the literature analyze the effects of standards on one product, one pesticide, or one product-pesticide pair or at best, few selected products-pesticides pair” (p.6). This make it difficult to understand the aggregate impact of standards.

Research quality: High

Manufacturing

Janssen, R. (2010) *Harmonising Energy Efficiency Requirements: Building Foundations for Cooperative Action*. Geneva: ICTSD

<https://www.ictsd.org/themes/environment/research/harmonising-energy-efficiency-requirements-building-foundations-for-co>

Research question: What are the implications of the increase in the use of energy efficiency standards on developing countries' exports of electronic products?⁹

Research design: Observational, qualitative (case study)

Key findings:

- **Barrier or catalyst:** Energy efficiency standards are barriers to trade for smaller developing countries, but not for larger developing countries. Producers in smaller developing countries, particularly those in Africa, “lag behind” in developing and implementing energy efficiency standards (p.v.). This blocks their participation in international electronics trade, as well as ongoing discussions on standards harmonisation. On the other hand, governments in large developing countries, such as Brazil, China and India, have introduced mandatory energy efficiency standards as part of their national energy policy frameworks. As a result, “the centre of gravity of [electronics] manufacturing has significantly shifted” towards these countries, and they have seen their trade in electronics increase (pp. 9-12).
- **Causal pathway:** *Lack of policy commitment*. The immediate cause of low implementation of energy standards in smaller developing countries is lack of policy. Electronics producers have not been required by national governments to comply with energy efficiency standards to sell in local markets. The root cause is that smaller developing country governments lack “the policy commitment to make capacity and resources available to develop and implement energy efficiency requirements” (p.v). This lack of policy commitment may be due to a lack of awareness of the trade and environmental benefits of these standards.
- **Policy recommendations:** OECD countries and international organisations need to provide developing countries with assistance on policy development in climate change and energy efficiency; technical assistance in all aspects of the standards development and implementation process; financial assistance to help in standards development and implementation; and exchange of best practices.

Treatment of standards: The review only includes evidence on energy efficiency standards, namely Energy Performance Standards (MEPs) and energy labelling. The implicit focus is on public standards (both national and international). The research does distinguish between “mandatory” and “voluntary” standards, noting that energy efficiency standards may be either depending on the country. However, it does not separate the impact of voluntary standards from regulations.

Research quality: Medium.

⁹ Since 1995, OECD countries have been very active in setting and revising energy efficiency standards for domestic producers of electronic products. There are currently ongoing efforts to harmonize energy efficiency standards at regional and global levels (for an overview, see pp. 14-22). The report investigates the impact of this trend on developing countries.

7. Further reading

Ederington, J. & Ruta, M. (2016). Non-tariff measures and the world trade system. *Policy Research Working Paper*, 7661. World Bank Group.

<http://documents.worldbank.org/curated/en/882991467989523068/pdf/WPS7661.pdf>

Annex 2 (pp. 84-87) lists 40 primary research studies investigating the impact of standards on trade in multiple sectors.

Suggested citation

Timmis, H. (2017). The Impact of Standards on Developing Country Exports. K4D Helpdesk Report. Brighton, UK: Institute of Development Studies.

About this report

This report is based on five days of desk-based research. The K4D research helpdesk provides rapid syntheses of a selection of recent relevant literature and international expert thinking in response to specific questions relating to international development. For any enquiries, contact helpdesk@k4d.info.

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