1

Executive Summary

INTRODUCTION

For the World Bank Group to achieve its twin goals of ending extreme poverty and boosting shared prosperity, the benefits of trade must be extended to all countries. But many countries lack the necessary infrastructure to meet the quality standards for entering global markets, because participation in world trade increasingly requires that suppliers comply with standards, technical regulations, and sanitary and phytosanitary measures. To overcome these technical barriers to trade in the most efficient and cost-effective way and to reap the benefits of trade, a functioning quality infrastructure (QI) ecosystem is crucial.

Using their vast experience in upgrading and reforming QI ecosystems, the World Bank and the National Metrology Institute of Germany (PTB) have partnered to develop the first comprehensive QI diagnostic and reform toolkit, which is designed to help development partners and country governments analyze their QI ecosystems and develop a coherent offering to support QI reforms and capacity development. This toolkit is also a valuable knowledge base for other interested parties to learn more about QI and reform their QI systems or parts thereof. Such reforms could focus on one, or any combination of, the following objectives:

- Improving the legal and institutional framework for efficient and effective QI
- Enhancing trade opportunities by removing unnecessary nontariff barriers and technical barriers to trade through harmonization of technical regulations and mutual recognition of conformity assessments
- Integrating into global value chains
- Enhancing overall quality of products and services
- Encouraging innovative products to be entered into high-value-added markets
- Increasing productivity and efficient use of scarce resources
- Providing for greater consumer protection

1.1 OVERVIEW

In a modern world with rapidly growing international trade, countries compete less based on the availability of natural resources, geographical advantages, and lower labor costs and more on factors related to firms' ability to penetrate and compete in new markets. One of these factors is the ability to demonstrate the quality and safety of goods and services as well as compliance with international standards in target markets. Consumers are the ultimate judges of the quality of goods and services, so products need to comply with specifications that buyers set, and they need to be proven not harmful to human health and the environment. To demonstrate such compliance, a sound QI ecosystem is essential.

1.1.1 What QI ecosystems do

The QI ecosystem can be understood as comprising the organizations (public and private), policies, and relevant legal and regulatory frameworks and practices needed to support and enhance the quality, safety, and environmental soundness of goods, services, and processes.[1] The QI ecosystem is required for the effective operation of domestic markets, and its international recognition is important to enable access to foreign markets. It is a critical element in promoting and sustaining economic development as well as environmental and social well-being, and it relies on metrology, standardization, accreditation, and conformity assessment (which comprises testing, inspection, and system or product certification). For a further general introduction to QI and its definition, see module 3: Standards.

Exporters wishing to participate in global trade face many challenges in complying with standards and technical regulations, including sanitary and phytosanitary measures. In the World Trade Organization's (WTO) Agreement on Technical Barriers to Trade (TBT Agreement), compliance with standards is seen as voluntary, whereas compliance with technical regulations is mandatory, has legal standing, and is therefore considered more onerous. For most of the world, 60–80 percent of global trade is subject to technical regulations (ITC 2016). For Africa, the effect is lower (40–60 percent) because much of Africa's trade is in mining materials that are not subject to technical regulations. Figure 1.1 shows the extent of technical regulations' influence on the trade of goods in various regions.

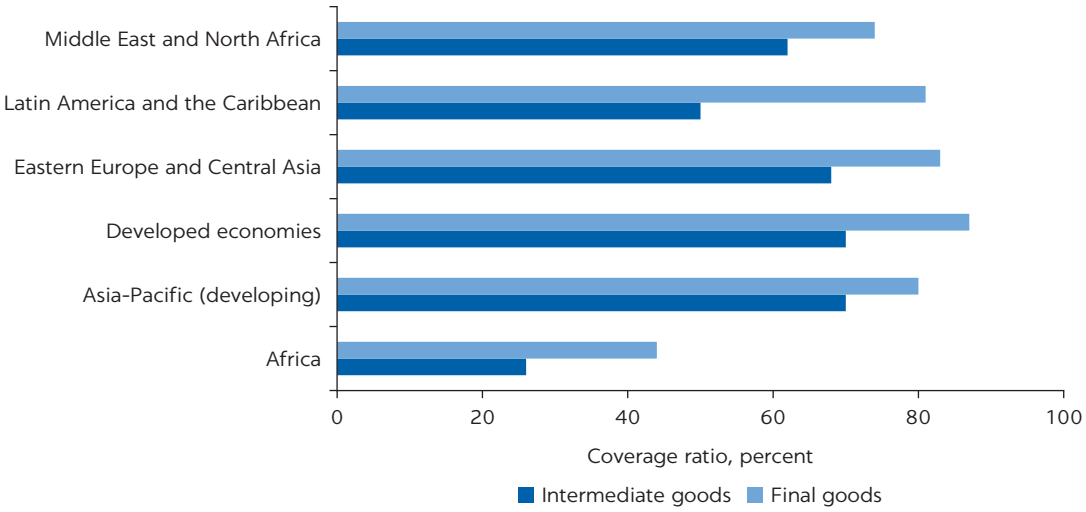
Nontariff trade barriers, consisting of technical and nontechnical barriers (figure 1.2), are equally problematic. The most efficient, cost-effective compliance with standards and technical regulations will help manufacturers, suppliers, and exporters gain access to local and foreign markets.

A modern QI ecosystem serves the needs of governments, businesses, and consumers in several ways:

- *For governments*, a QI ecosystem serves as a mechanism to support relevant trade and industrial policies and ensures enforcement of mandatory technical regulations. A recent study in the United Kingdom found that more than £6 billion in additional U.K. exports per year could be attributed to standards (Cebr 2015).
- *For businesses,* a modern, efficient QI ecosystem helps limit the cost of production, increasing productivity and enabling firms to be more competitive in domestic and foreign markets. Use of standards helps firms adopt new

FIGURE 1.1

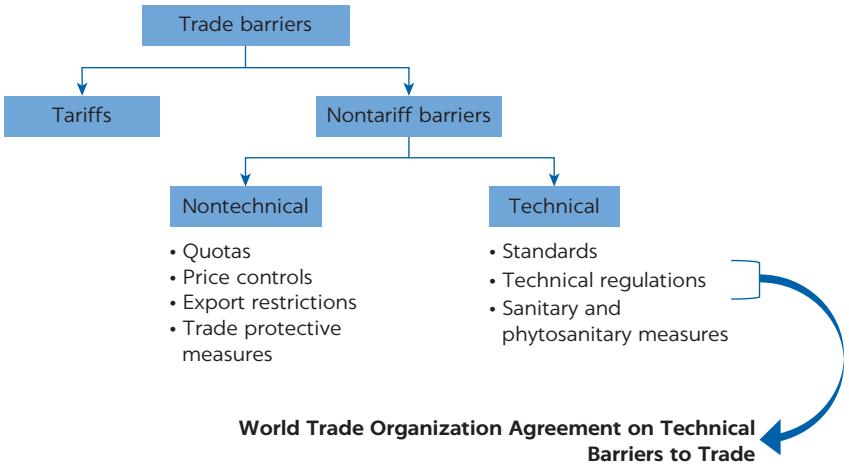
Share of goods trade subject to technical regulations, by region, 2014



Source: ITC 2016.
Note: The "coverage ratio" is the share of trade subject to at least one technical regulation. The 2014 dataset used covered 53 economies, as reported by Franssen and Solleder (2016). The sample of "developed economies" included 25 European Union countries (treated as one country, owing to identical trade regulations); Hong Kong SAR, China; Israel; and Japan. The sample of "Asia-Pacific (developing)" economies included Afghanistan, China, India, Nepal, Pakistan, the Philippines, and Sri Lanka.

FIGURE 1.2

Categories of barriers to trade



technologies and innovation in their production processes. A survey of British companies found that more than 60 percent of product and process innovators used standards as a source of information for innovation (Guasch et al. 2007), and 37.4 percent of productivity growth can be attributed to the use of standards (BSI 2016).

- *For consumers,* a QI ecosystem ensures public health and safety as well as environmental and consumer protection. Technical regulations play an important role in this regard, together with effective enforcement mechanisms such as market surveillance. These mechanisms ensure that fraudulent and counterfeit products are not traded in the marketplace.

1.1.2 Objective of the toolkit

The objective of the toolkit is to help development partners and governments analyze countries' QI ecosystems. Based on the results, the toolkit provides recommendations to bridge gaps in the QI ecosystem, support reforms, and build the capacity of institutions. The toolkit consists of 12 modules to provide a valuable knowledge resource as a holistic reference—supported by practical case studies and examples—for QI diagnostics, reform interventions and approaches, and monitoring and evaluation.

1.2 QUICK START GUIDE

The toolkit has 12 modules, each of which is further described in the concluding section of this executive summary:

- *Module 1:* Executive Summary
- *Module 2:* Importance of QI Reform and Demand Assessment
- *Module 3:* Standards
- *Module 4:* Metrology
- *Module 5:* Accreditation
- *Module 6:* Conformity Assessment
- *Module 7:* Technical Regulation
- *Module 8:* The Quality Infrastructure as a Flexible PPP System
- *Module 9:* Diagnostic Tools
- *Module 10:* How to Reform: Interventions and Approaches
- *Module 11:* Challenges of QI Reform
- *Module 12:* Monitoring and Evaluation: Performance and Impact of the QI Reforms

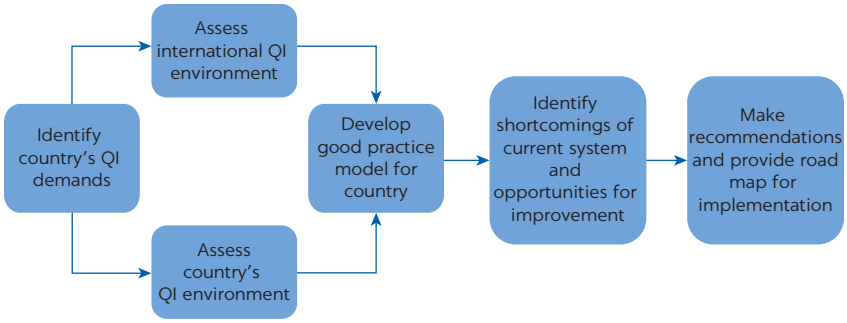
1.2.1 Importance of the QI

QI services are necessary to

- Enhance market access, facilitate product diversification, and increase investment opportunities;
- Enhance productivity by
  - Reducing costs of trade through reduced duplication in testing and inspection, streamlined operations, and fewer restrictive regulations;
  - Benefiting from economies of scale through improved and standardized working methods and interoperability between manufacturers along the value chain; and
  - Enhancing innovation and technology diffusion; and
- Promote public policy objectives through effective enforcement of technical regulations regarding public health and safety and consumer, environmental, and social protection.

To learn more about the importance of QI, see module 2: Importance of QI Reform and Demand Assessment. To learn more about the QI ecosystem and one of its fundamental elements—standards—see module 3: Standards.

FIGURE 1.3
The QI toolkit workflow: Reforming the quality infrastructure



1.2.2 QI toolkit workflow

This QI toolkit has been developed with a logical workflow (figure 1.3). It starts by comparing demand for QI services with supply, which leads to the identification of gaps between what is needed and what is being offered in the QI ecosystem and is addressed through the development of a road map for QI reforms.

Because the QI ecosystem is complex, the current supply of QI services is analyzed in a two-stage process to make the decision-making process more efficient (figure 1.4): (1) After initiation, the project starts with a *rapid diagnostic* of demand for and supply of QI services, resulting in a concept note, which helps determine whether a development project is worthwhile. (2) If it is deemed to be so, a much more *comprehensive evaluation* of the QI ecosystem demand-and-supply situation in the client country is conducted. The project can then develop a reform design to address some or all of the identified gaps, depending on development project objectives, client capacity, and available resources. Guidance on implementation and monitoring modalities are also covered.

1.2.3 The rapid diagnostic

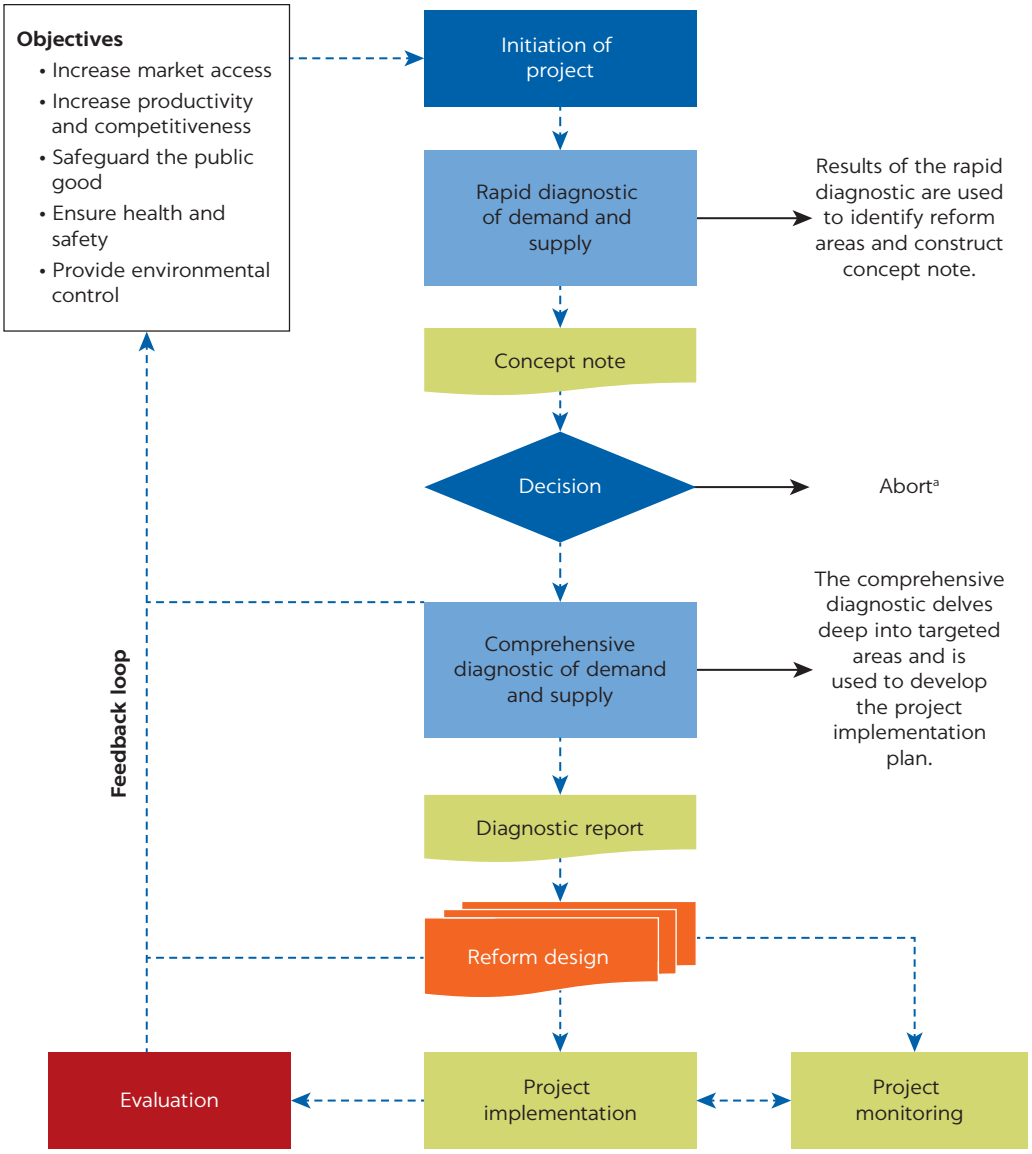
An initial decision to assess a country's QI ecosystem having been made, a *rapid diagnostic* is done of the QI ecosystem to develop a *concept note* (figure 1.5).

1.2.4 The comprehensive diagnostic

Based on the concept note, a decision can be made as to whether to run a QI development project. Design of the development project and its implementation program should begin with a *comprehensive diagnostic*, the outcome of which will be a *diagnostic report* (figure 1.6).

To learn more about how to use the Comprehensive Diagnostic Tool to its full advantage, see module 9: Diagnostic Tools. For discussion of the detailed demand assessment, see module 2: Importance of QI Reform and Demand Assessment.

FIGURE 1.4
Stages of QI toolkit processes



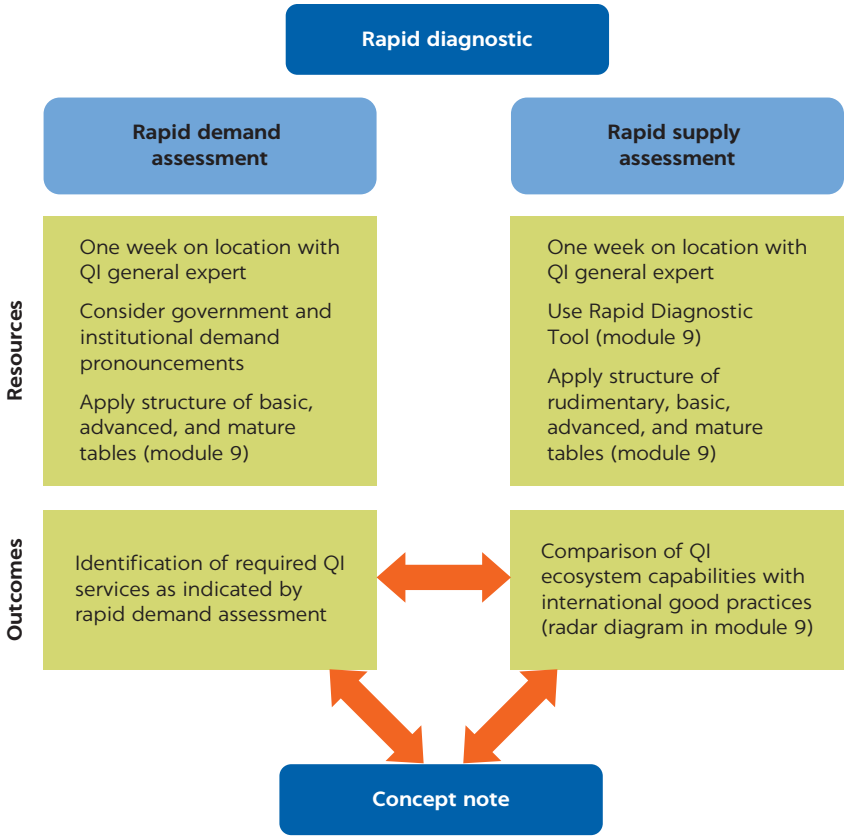
Note: QI = quality infrastructure.
a. The decision to abort a project is made on a case-by-case basis, although projects should be implemented only with full support from the client country, and a reasonable expectation that project objectives will be achieved.

1.2.5 Project cycle

Figure 1.7 illustrates the support to governments in developing modern, efficient QI systems that help producers improve the quality of their products and services to compete domestically and globally. In this project cycle, after identifying key gaps in the QI ecosystem through a market assessment—which analyzes the existing supply and potential demand for quality assurance services (comprising testing, inspection, and certification)—recommendations based on good international practices to meet such demand are suggested. The World Bank and the PTB also provide implementation support for these reforms, tailoring them to specific country conditions.

FIGURE 1.5

Stage 1: Rapid diagnostic and concept note process for a QI development project



Note: QI = quality infrastructure.

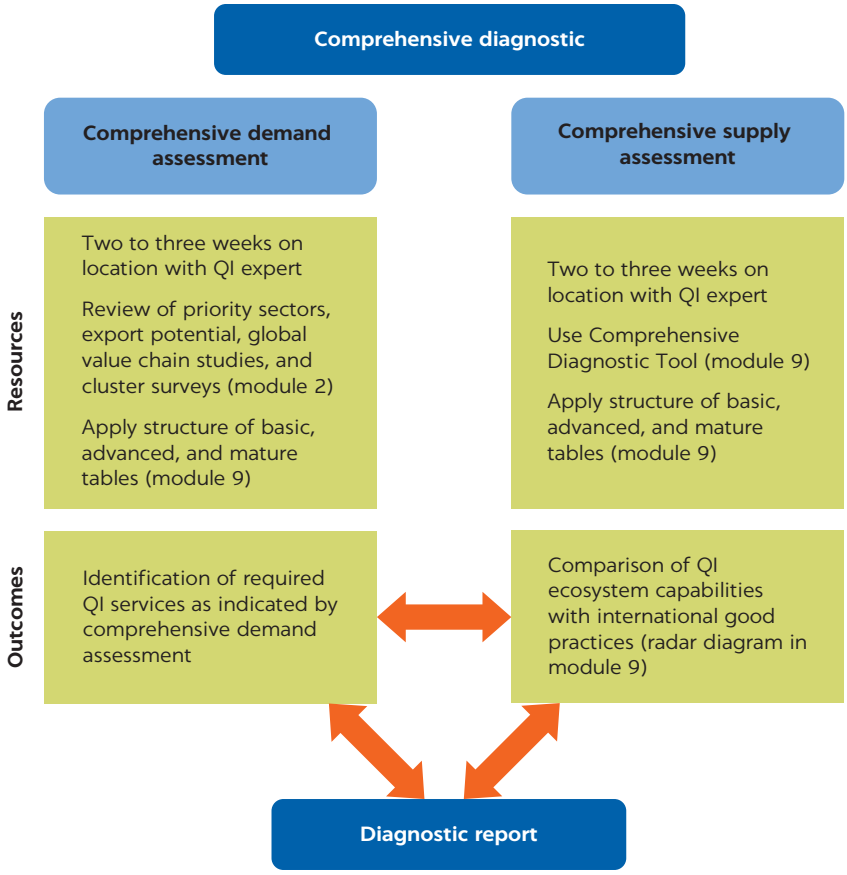
1.2.6 Lessons learned about project design and implementation

A development project, along with its implementation program, should close the gap between demand for and supply of services by QI institutions. Some key principles to be considered in project design include the following:

- *Refrain from setting overoptimistic short-term targets,* instead embedding short-term assistance in longer-term objectives, including those within the beneficiary government's long-term policies and planning.
- *Agree with partners on a stepwise approach* that differentiates reform targets based on the current development stage of a country's QI ecosystem, differentiated in the QI toolkit as follows:
  - *Rudimentary:* Set mainly basic QI targets.
  - *Basic:* Consolidate the basic services, and set mainly advanced QI targets.
  - *Advanced:* Consolidate the basic and advanced services, and set mainly mature QI targets.
  - *Mature:* Consolidate the basic, advanced, and mature services, and broaden the QI intervention scope.
- *Find the right technical assistance balance* between (a) commitment of technical assistance delivery, (b) absorption capacity of the recipient country and

FIGURE 1.6

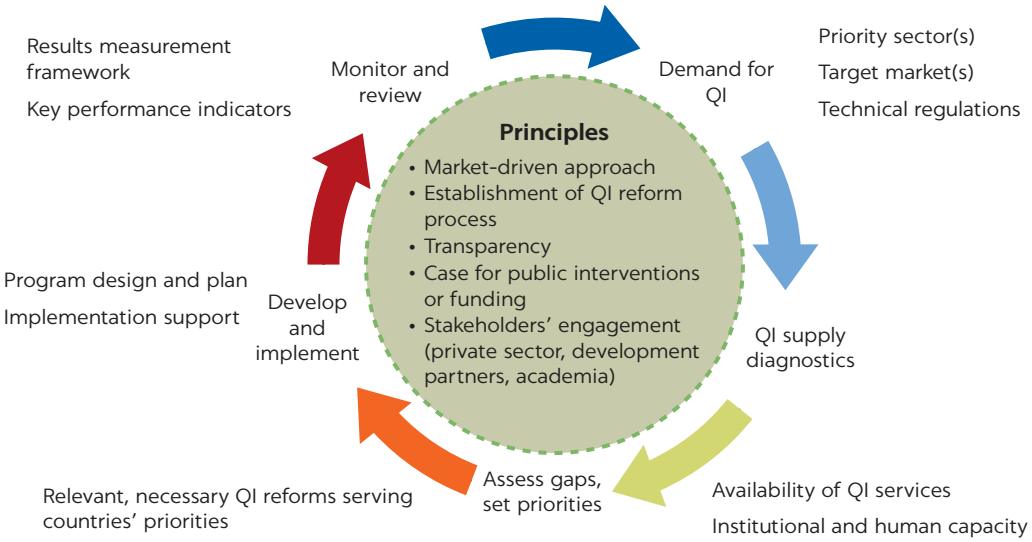
Stage 2: Comprehensive diagnostic and diagnostic report process for a QI development project



Note: QI = quality infrastructure.

FIGURE 1.7

The QI development project cycle



Note: QI = quality infrastructure.

institutions, and (c) provision of highly technical services by the development partner.
- *Take into account the demonstrable demand* for quality-related QI service delivery. If need be, project design should develop demand and supply in parallel.
- *Anchor the project in the right partner institution* (one directly responsible for the field covered) to ensure "ownership." Use project steering committees and continuous information flows to reinforce this ownership.
- *Strengthen business service providers* (intermediaries), which is often more effective and sustainable than providing direct services through the project.
- *Keep a wide range of firm sizes in mind.* Chances of short-term success in supporting larger enterprises should not be the only goal. The small and medium enterprises (SME) sector is more difficult to reach but, in the long run, may be more important for the country.
- *Pursue complementary objectives as needed.* Institutional strengthening may have to be paired with development and promulgation of the appropriate legislative framework, even though the latter is much more demanding in terms of guiding draft or revised legislation through the political process.
- *Choose equipment suppliers selectively* for laboratories or other institutions. Development partners should focus as much as possible on a limited number of suppliers to avoid problems with equipment maintenance.
- *Shift from direct provision of training to local responsibility* to enhance the sustainability of training functions in key institutions.

For detailed information on developing an effective, efficient implementation program, see module 10: How to Reform: Interventions and Approaches and module 11: Challenges of QI Reform. Carefully consider both in the design of an implementation program.

1.2.7 Monitoring and evaluation of QI development projects

Implementation programs need to be monitored continuously to ensure that the designed outputs are achieved within the desired time frame and within budget. Mid-term and end-of-project program evaluations provide feedback on long-term effects and lessons learned to enhance future project designs. Both need to be provided for in project design and agreed upon with the client country and institutions.

Each project is different and thus will require a different set of performance indicators that will inform the Theory of Change and the logical framework (or "logframe") of the change process.[2] Although module 12 provides examples, indicators should be developed on a case-by-case basis. The most important thing to consider when developing indicators is that they be relevant and measurable. Indicators that cannot be measured are not useful, because they would have to rely on subjective interpretations. Once performance indicators are determined, they should be formally agreed upon with the development partner and the recipient country or organization.

For detailed information on implementation program monitoring and project evaluation, see module 12: Monitoring and Evaluation: Performance and Impact of the QI Reforms.

1.3 QI TOOLKIT MODULE DESCRIPTIONS

In addition to this executive summary, the remaining 11 of the 12 modules each has a distinct focus, as described below.

***Module 2*: Importance of QI Reform and Demand Assessment.** Module 2 covers the role of the QI ecosystem in improving market access and competitiveness; trade facilitation and integration into global value chains; innovation and technology diffusion; and productivity. It also examines the QI ecosystem's role in customer protection, health and safety, and environmental protection.

A proper demand assessment is critical to both capacity building in the QI and the identification of effective reforms. The module broadly discusses identification of the demand for and needs of important industrial sectors and export markets. It also explores the identification of gaps between supply and demand for QI services and provides information on specific activities to be pursued. It lists techniques for providing appropriate information, such as value chain studies and market surveys. Outlining the requirements for generic QI ecosystem capacity building is an important part of the holistic approach to demand assessment.

***Module 3*: Standards.** The QI ecosystem is a complex array of the interdependent organizations needed to provide QI services. There are not many definitive publications describing the QI ecosystem holistically that can be referenced to construct a detailed assessment, so modules 3–8 elaborate on each element of the QI ecosystem in detail. Module 3 focuses on the first of the three fundamental elements of the QI: standards.

***Module 4*: Metrology.** Metrology, the science of measurement, is arguably the oldest of the three fundamentals of the QI. It has developed into one of the most sophisticated sciences—and one in which cooperation across the world is absolutely essential to maintain modern technology. Module 4 explores in detail the three categories of metrology: scientific metrology, legal metrology, and industrial metrology.

***Module 5*: Accreditation.** The third fundamental element of the QI is the most recent to be developed: accreditation. Module 5 examines its importance and applicability, especially in countries dependent on global trade, because of its facilitating role in international recognition systems for the services of the QI.

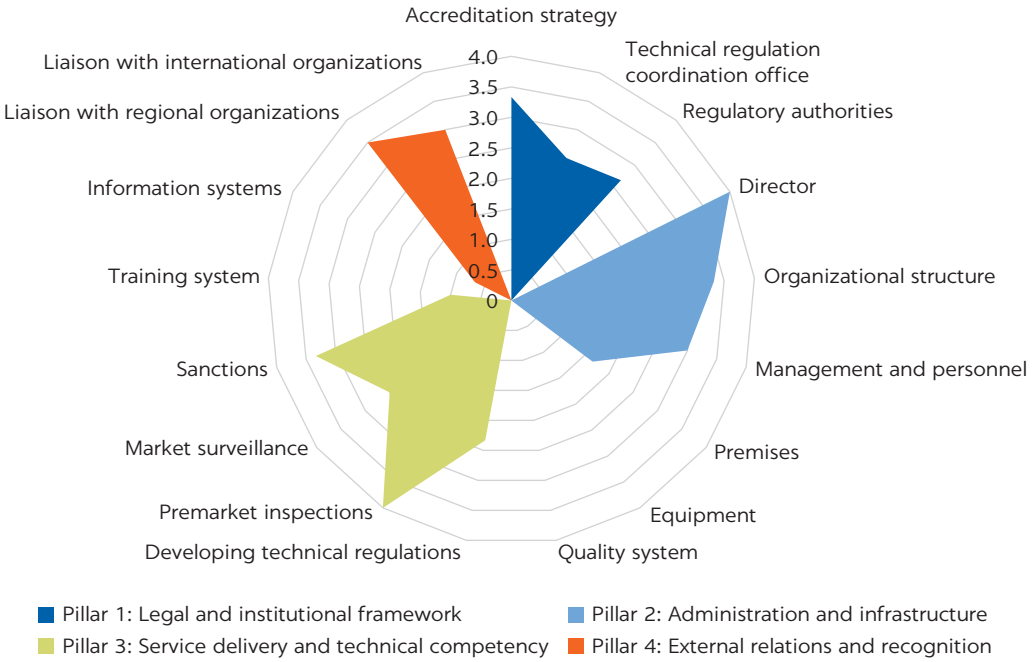
***Module 6*: Conformity Assessment.** Conformity assessment services generally comprise inspection, testing, and product and system certification. Module 6 describes the scope and application of each within the QI.

***Module 7*: Technical Regulation.** Technical regulations are a mandatory part of the QI—being legally binding prescriptions—whereas standards compliance is voluntary. Module 7 explains these distinctions and discusses particularly the provisions in the WTO TBT Agreement regarding the development of technical regulations.

***Module 8*: The Quality Infrastructure as a Flexible PPP System.** The QI ecosystem is presented as a flexible system with a focus on its public-private partnership dimensions.

FIGURE 1.8

Sample radar diagram and snapshot of a country QI ecosystem



Note: QI = quality infrastructure.

***Module 9*: Diagnostic Tools.** The Rapid Diagnostic Tool and the Comprehensive Diagnostic Tool are based on the concept of building blocks arranged in four pillars to describe a specific QI service. The results of a diagnostic can be depicted as a radar diagram (figure 1.8). Application of the Rapid Diagnostic Tool provides users with high-level information on the capacity of a country's QI ecosystem, which together with a rapid demand assessment provides guidance on whether a QI development project would be beneficial to develop and implement.

The Rapid Diagnostic Tool consists of questions whose answers result in a set of scores ranging from 0 to 4, which are then collated to provide an overall score also ranging from 0 to 4. These scores can then be used to construct a QI service radar diagram to indicate the state of QI services at a glance (figure 1.8), as discussed in module 9. The scores are categorized in four levels of implementation:

- *0–1.0:* Little or nothing is in place, and the country must develop the relevant elements of a QI ecosystem from scratch.
- *1.1–2.0:* A rudimentary system needing much fundamental development is in place.
- *2.1–3.0:* A reasonable system is in place but needs further development.
- *3.1–4.0:* A good system is in place with no need for fundamental development, but maintenance is important.

The Rapid Diagnostic Tool can be applied as a spreadsheet that calculates the scores and draws the radar diagrams automatically. An expert should be able to gather information for the Rapid Diagnostic Tool within a week or two on-site, provided that he or she has the full support of knowledgeable local persons. The expert would also be able to use these results to categorize the QI ecosystem as rudimentary, basic, advanced, or mature, which requires a qualitative evaluation of all the results based primarily on his or her experience and knowledge.

Use of the Rapid Diagnostic Tool is not confined to evaluation of the QI ecosystem before any intervention is contemplated; it can also be used as a monitoring and evaluation tool to show the continued development or otherwise of the QI. In this way, policy makers and practitioners can be apprised fairly easily of progress, or the lack thereof, which can lead to appropriate action at the political level or by the recipient organization.

The Comprehensive Diagnostic Tool contains a detailed approach to evaluation of various elements of the QI. It is based on four pillars that address the QI environment, its institution and services, and its recognition (a holistic approach), as follows:

- *Pillar 1:* Legal and institutional framework
- *Pillar 2:* Administration and infrastructure
- *Pillar 3:* Service delivery and technical competence
- *Pillar 4:* External relations and recognition

Each of the four pillars is divided into a number of building blocks that must be in place for the elements of the QI ecosystem to function optimally and to comply with international good practices. Some of the building blocks of the QI ecosystem elements would be similar to each other, but there are also some significant differences, and the building-block number designating each QI ecosystem element will differ depending on individual requirements. The same information can be used to develop a radar diagram.

Module 9 fully describes how to assess each of the QI services. After an in-depth evaluation, which typically takes an expert three weeks on location, a score can be assigned to each of the building blocks and can be presented graphically as four different colors—each denoting, for example, the level of implementation or compliance. This would give a "dashboard" type of picture that policy makers and higher-level officials who may not have a detailed understanding of the QI ecosystem elements can readily understand.

***Module 10*: How to Reform: Interventions and Approaches.** This module covers three major areas:

- *The policy and legislative domain.* The starting point for effective reform of the QI ecosystem is development of a holistic government policy in the form of a national quality policy, the characteristics of which are described. Thereafter, the reform of the QI ecosystem, related legislation, and the institutional framework are discussed in detail, including information on strategies and relevant training of technical staff.
- *The QI ecosystem.* Establishing standardization for competitiveness is discussed in detail in subsections on new standards, compliance with public and private standards, global value chains, and areas policy makers could consider. Also detailed are ways to strengthen the metrology and accreditation systems and to establish and strengthen conformity assessment services. Finally, this section covers alignment of the technical regulation regime with international good practices as well as resolution of conflicts of interest within the QI ecosystem.
- *The external environment.* This section examines the positive influence that global value chains and foreign direct investment can have on the QI ecosystem. It also discusses the QI ecosystem's potential influence on innovation, which is a recognized driver of industrial development and competitiveness.

***Module 11*: Challenges of QI Reform.** Project preparation and management are crucial to project success. This module discusses in detail the good practices for QI ecosystem reforms, which pose unique challenges that need to be considered. It also provides guidance on strategic approaches to supporting development of the QI ecosystem, with a focus on institutions.

***Module 12:* Monitoring and Evaluation: Performance and Impact of the QI Reforms.** Projects need to be monitored regularly to determine progress on project objectives. Progress is usually measured against logical frameworks established before the start of the project, an example of which is discussed. Project evaluation—with one-time exercises being different from monitoring—are also important to determine project outcomes in a broader context and to determine whether development partners have been effective, so as to gain knowledge for future projects. Various evaluation modalities are discussed in detail.

NOTES

1. The "organizations" of the QI ecosystem provide such things as national standards, calibration, test reports, certification reports, and accreditation certificates. "QI services" is used as a collective term to denote these outputs of QI organizations.
2. Theory of Change is a specific methodology for planning, participation, and evaluation. It defines long-term goals and then maps backward to identify necessary preconditions. The logical framework, or "logframe," is a way of presenting the "logic model" as a sequence of modalities illustrating the change process. For a detailed discussion of the Theory of Change and logframes, see module 12: Monitoring and Evaluation: Performance and Impact of the QI Reforms.

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