

4. MACHINERY EXPANDING MECHANIZATION WHILE ENSURING QUALITY AND SAFETY



Tractor accidents can be fatal and have direct economic consequences for poor farmers. Imagine a farmer who spends all of the family savings to buy a new tractor in hope of improving her farmland and increasing productivity. One day while working the field, she approaches a steep hill, and the tractor rolls over and fatally crushes her. Stricter quality control and safety regulations such as requiring roll-over protective structures and seatbelts on tractors could prevent these accidents and avoid the economic loss that her family must endure.

EBA machinery indicators measure obstacles facing dealers who import tractors for sale. Besides meeting the requirements for import and registration, the indicators also measure the regulations on standards and safety for operators of tractors. Regulations on imports, standards and safety and other requirements for introducing mechanical technology to the market affect the availability of appropriate machinery to farmers and agribusinesses. Agricultural machines can increase production since they are labor-saving and directly increase yields and production¹ with more efficient operations that can cultivate more land.² Agricultural mechanization spurs rural economic growth and ultimately improves rural livelihoods.

The *EBA* machinery indicators use agricultural tractors as a proxy to assess the regulations for agricultural machinery. Agricultural tractors are the most representative form of agricultural machinery and are used at different stages of agricultural production, from land preparation to harvest. The use of tractors around the globe make tractor-related indicators comparable across countries, unlike other forms of machinery specific to certain crops or regions.

Tractor dealer requirements, the first indicator for *EBA* machinery, was selected for study because there are a number

of prerequisites that must be ensured at the machinery dealer level that directly impact the availability of high-quality tractors. To enable the private machinery sector and promote farm mechanization services to farmers, appropriate government institutions responsible for standards, health and safety need to be in place.³ Having national or regional centers for impartial testing and evaluation of agricultural machinery is a good practice. Conforming with established national or international standards, these tests ensure the quality of tractors and their suitability to country conditions. Tractor registration is another area where there are significant differences between countries. Lengthy and expensive procedural requirements stifle competition, limiting the players and products in the market. Providing after-sales services—sales of spare parts and training on how to use a tractor safely and correctly—are equally important. Having domestic support facilities that offer parts and repairs is an element of successful mechanization.⁴

Tractor standards and safety, the second *EBA* machinery indicator, addresses national and international standards on tractor performance and safety and how countries ensure that only high-quality machines enter their supply chain⁵ and that consumers are given unbiased information about tractors. Given that the agricultural machinery industry is

a global industry, with tractors manufactured on one continent and sold on another,⁶ international standards also help facilitate international trade.⁷

The third indicator for *EBA* machinery focuses on the requirements for importing agricultural tractors. Local manufacturing of agricultural tractors is concentrated in a few countries and the majority of countries rely on imports. Inefficient and costly import licensing obstructs trade in many countries, making it difficult for tractor importers to introduce their products in the market. Balancing control and efficiency requirements eases importing machinery.

Several other factors that are currently not measured—such as specific mechanization policies and market realities—also affect the agricultural machinery sector. Among the major constraints to increased levels of mechanization are the poor access of farmers to agricultural technologies (mainly as a result of the high cost of mechanization inputs) and the low purchasing power of smallholder farmers to acquire machinery. These factors limit both the demand by farmers and the supply of machinery, which, in turn, keeps prices high and stifles competition.⁸ Also important, however, are the unfavorable regulations that machinery suppliers face in many countries and which is the main focus of the current

indicators. The indicators encourage the adoption of smart regulations that enable competitive markets in the agricultural machinery sector while ensuring tractor quality and safety.

The data cover the following areas:

- Tractor dealer requirements.** These indicators measure legal requirements for suitability testing of agricultural tractors, specific licensing required to operate a tractor, and warranties and post-sale services that must be provided at the retail level.
- Tractor standards and safety.** These indicators look at legal requirements for operational safety and performance standards of tractors.
- Tractor import requirements.** These indicators look at aspects of importing agricultural tractors,

including the private machinery sector’s role and the required procedures to import.

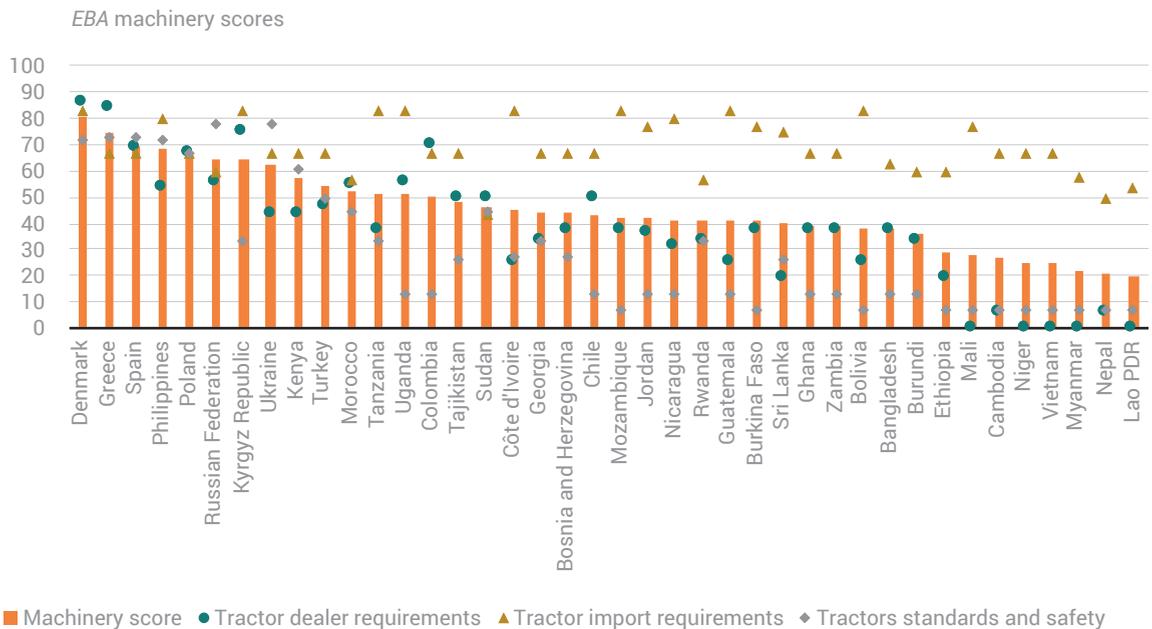
For the machinery topic the laws and regulations appear strongest in EU countries (Denmark, Greece, Poland and Spain) and in the Philippines (figure 4.1). All five countries share a substantial number of good practices. Denmark, Greece and Spain have strong regulations related to tractor dealer and import requirements. The Philippines has strong regulations for tractor standards and safety. The Kyrgyz Republic is among the top performers in regulations for tractor import requirements but performs below average on standards and safety. The two countries surveyed in the Middle East and North Africa—Jordan and Morocco—score slightly better than the sample average, but vary on some indicators. Jordan has higher scores tractor import requirements but performs below average on standards and safety and on tractor dealer requirements, while Morocco has higher scores

on regulations for standards and safety but insufficient import requirements. The five countries with the lowest scores across all three indicators are Lao PDR, Myanmar, Nepal, Niger and Vietnam—each demonstrating room to adopt many of the good practices identified by EBA.

Most countries targeted require tractors to be registered, but the cost varies

Registering agricultural tractors is a good practice, among others, because it establishes ownership rights over the purchased tractor and facilitates the enforcement of road, safety and tax regulations. Many tractor manufacturers recommend that original equipment manufacturer (OEM) engines or drivetrain components be registered, and in doing so, provide tractor owners the opportunity to extend the standard warranty periods for their machine, but this procedure is not required in all surveyed

FIGURE 4.1 Denmark, Greece, Spain, the Philippines and Poland have the top five scores in the aspects measured by the machinery topic



Source: EBA database.

countries. Of the 40 countries, 27 require companies to register imported machinery, and only in Denmark is registration free. In the other 26 countries the registration cost for imported tractors ranges from 0.03% of average income per capita in the Philippines to 34.7% in Sudan (figure 4.2).

Few countries require importers to test machinery

Some countries have machinery testing and evaluation centers to determine what machinery is suited to country conditions and can enhance the productivity of farmers.⁹ Typically carried out according to standards established by national authorities or international standardization organizations, these tests help farmers compare and select machinery. Of the 40 surveyed countries, 12 require

private companies to obtain proof of suitability of tractors, costing from 1.1% of income per capita in the Kyrgyz Republic to 765% in Tanzania.

Few countries studied require after-sales services by law

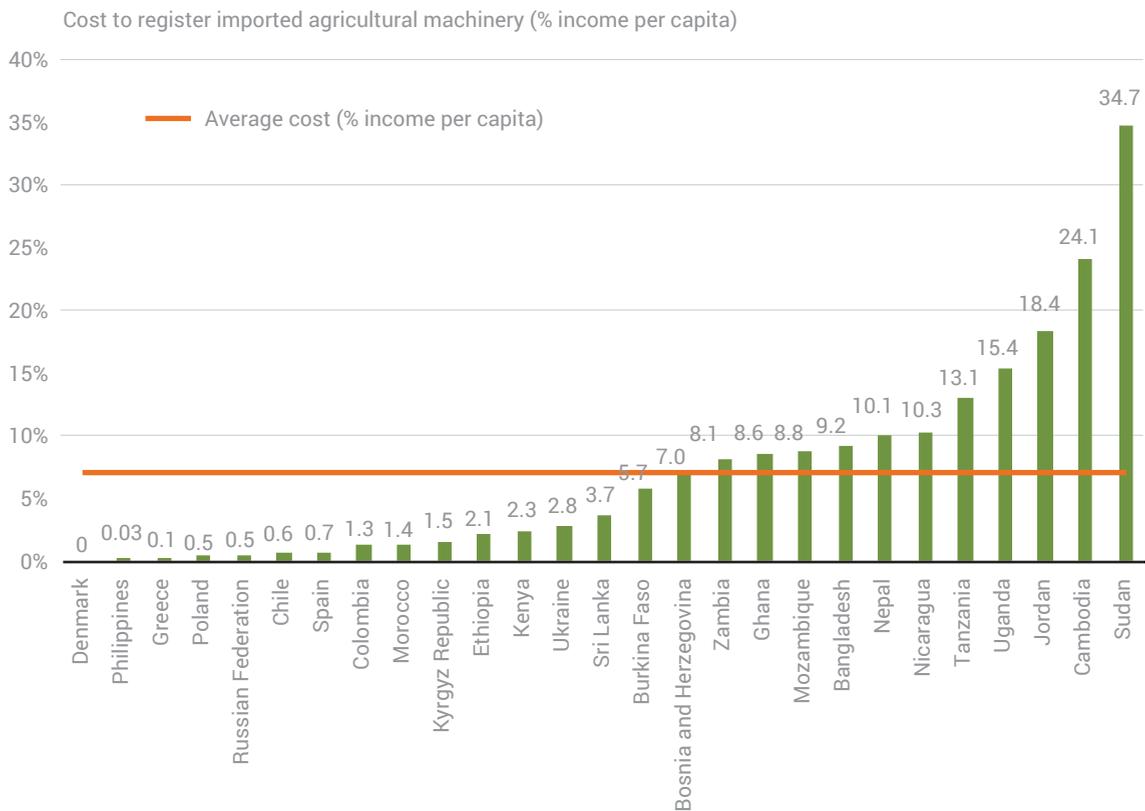
Farmers in many countries do not have access to machinery after-sales services, limiting their access to maintenance or spare parts. This is especially relevant in countries where there is little control on the quality of imported goods, which can lead to the import of substandard tractors.¹⁰ Requiring that tractor dealers provide after-sales services is a good practice since it gives more security to buyers (box 4.1). Only seven of the countries studied legally require after-sales services. Five of them—Colombia, Denmark, Greece, the Philippines and

Turkey—require that dealers of agricultural tractors provide reparation services and supply spare parts if needed. Colombia also requires that machinery dealers provide training on how to use a tractor. None of the surveyed countries require that machinery dealers provide training on the maintenance of tractors (table 4.1).

Requirements for import licensing and permits and incurred costs vary significantly across countries

Few developing countries manufacture agricultural equipment and machines domestically. So machinery acquisitions rely on imports—usually handled by the private sector. Many countries require companies to register as machinery importers. This is a good practice because it gives public authorities a better understanding of trade flows in the country and

FIGURE 4.2 The cost to register imported tractors is highest in Sudan



Source: EBA database.

BOX 4.1 Good practices for tractor dealer requirements

- Should require compulsory testing of tractors in conformity with established standards.
 - The test/proof of suitability should be affordable.
- Should require tractor registration.
 - The registration should be affordable and the process efficient.
- Should require tractor manufacturers or dealers to provide post-sale services, including:
 - repairing tractors.
 - replacing or returning poor quality tractors.
 - supplying spare parts.
 - training users in operating tractors.

ensures the quality of imported goods (box 4.2). In addition, importers may be required to obtain a permit each time they wish to import tractors. But import permits can often be used as trade barriers, creating costly burdens for importers. Among the 14 countries that require machinery importers to be registered, the incurred costs vary. They range from more than 35% of income per capita

in the Philippines to minimal or no cost in Sri Lanka (0.2% of income per capita), Jordan (0.3% of income per capita) and Bolivia, Mali and Nicaragua (free of charge). Mozambique levies a striking cost of 880.6% of income per capita on importer registration (figure 4.3).

Among the 13 countries that require import permits, the average cost is 4.6%

of income per capita. In Morocco and Rwanda, obtaining an import permit is free, while in Bangladesh the cost is over 40% of income per capita. Seven countries—Bangladesh, Burkina Faso, Ethiopia, Jordan, Myanmar, the Philippines¹¹ and Sudan—impose both the cost for registration as importer and the cost of import permit.

Most countries lack safety regulations that prevent injuries to machinery operators

Safety guidelines for machinery operators are a good practice because they can prevent or reduce worker injury and damage to machinery, saving lives and costs. Seat belts and roll-over protective structures have proven to be “99% effective in preventing death or serious injury in the event of tractor roll-overs” in the United States.¹² Since tractors often operate on uneven ground, a roll-over is a constant risk for workers.¹³ But many safety measures are not required by law in most surveyed countries. Only nine countries require tractors to be equipped with roll-over protective structures: Denmark, Greece, Poland and Spain, Kenya, the Philippines, the Russia, Turkey and Ukraine.

Conclusion

Agricultural mechanization improves agricultural productivity, thereby enabling

TABLE 4.1 Countries where post-sale services are required by law

	REPAIR OF TRACTORS	WARRANTY ON TRACTORS	SUPPLY OF SPARE PARTS	TRAINING ON TRACTOR OPERATION
COLOMBIA	✓	✓	✓	✓
DENMARK	✓	✓	✓	
GREECE	✓	✓	✓	
JORDAN		✓		
MOROCCO		✓		
PHILIPPINES	✓		✓	
TURKEY	✓	✓	✓	

Source: EBA database.

BOX 4.2 Good practices for tractor import requirements

- Should allow private companies, including foreign firms, to import new and second-hand tractors, as well as spare parts for sale.
- Should require pre-shipment inspections of agricultural tractors at the port of export in order to verify quality, quantity, price and classification of the imported good.
- Should require private companies to register as importers of agricultural tractors. The registration should not be limited to a restricted time period.
 - In countries where the registration is limited to a specific time period, the validity should be at least 10 years.
 - The cost of the registration should be affordable.
- Should allow private companies to import agricultural tractors without an import permit.
 - In countries where the permit is required, the permit should not be limited to a restricted time period.
 - The cost of the permit should be affordable.

markets for rural economic growth and improving rural livelihoods. There is still much to be done in countries to improve the enabling environment for successful agricultural mechanization and move toward the good practices identified, such as:

- **Safeguard availability and timely delivery of agricultural tractors through streamlining import procedures.** In Bolivia registering as a tractor importer has no cost, and importers are not required to get a permit each time they wish to import tractors.
- **Ensure that imported tractors suit country conditions by requiring testing of agricultural machinery.** In the Kyrgyz Republic regulations require that tractors be tested to ensure their suitability to country conditions, as well as their compliance with established performance standards. The cost of the test is minimal.

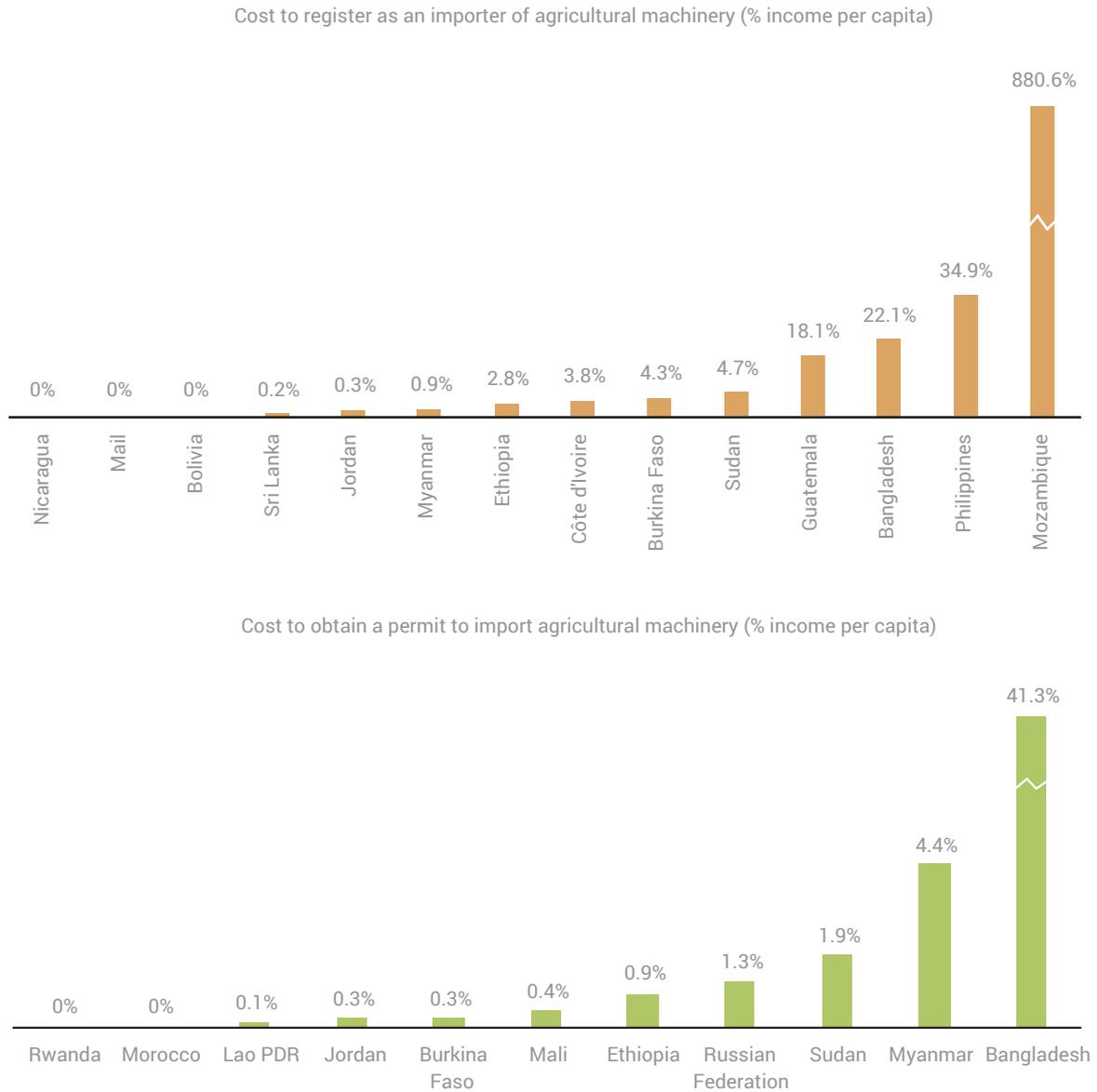
- **Facilitate tractor durability by requiring tractor registration and appropriate after-sales service.** In Colombia appropriate after-sales services must be provided at the tractor dealer level. It is also required that tractors must be registered; the registration can be obtained within two days at a minimal cost.

BOX 4.3 Good practices for tractor standards and safety

- Should require that manufacturers of agricultural tractors comply with national quality and performance standards.
- Should require that national tractor standards be in accordance with international standards (International Organization for Standardization, Organisation for Economic Co-operation and Development).
- Should require that agricultural tractors be equipped with a fixed roll-over protective structure and seatbelts.

- **Guarantee high-quality tractors by requiring compliance with national and international performance standards.** Fifteen of the 40 studied countries have established national standards for agricultural tractors, and 10 stipulate that imported tractors should conform to international standards.
- **Ensure safety of tractor operators by enforcing safety standards such as roll-over protective structures and seatbelts.** Regulations in Kenya stipulate that agricultural tractors must be fitted with a roll-over protection structure (ROPS) and require that seatbelts must be fitted where a ROPS structure is in use (box 4.3).

Laws and regulations that promote both control and efficiency requirements can help facilitate and ease the availability of machinery for agricultural production. The machinery topic identifies and measures several key regulatory constraints that can hinder farmers' access to appropriate machinery. The topic uses agricultural tractors as a proxy to assess the regulations for agricultural machinery. These actionable indicators are intended as a starting point for discussion with policymakers on possible ways to address regulatory constraints and inefficiencies that might obstruct the expansion of mechanization, the quality of imported tractors and safety of tractor operators.

FIGURE 4.3 Mozambique and Bangladesh impose high costs on importers of agricultural tractors

Source: EBA database.

Note: Countries that require companies to register as an importer of agricultural machinery: Bangladesh, Bolivia, Burkina Faso, Côte d'Ivoire, Ethiopia, Guatemala, Jordan, Mali, Mozambique, Myanmar, Nicaragua, the Philippines, Sri Lanka and Sudan. Countries that require companies to obtain a permit to import agricultural machinery: Bangladesh, Bosnia and Herzegovina, Burkina Faso, Ethiopia, Jordan, Lao PDR, Mali, Morocco, Myanmar, the Philippines, Russian Federation, Rwanda and Sudan. Bosnia and Herzegovina and the Philippines were excluded from the lower figure because the price of the import permit for agricultural machinery is calculated as a percentage of the customs value.

Notes

1. Houmy and others 2013.
2. FAO and UNIDO 2008.
3. Sims and Kienzle 2009.
4. FAO and UNIDO 2008.
5. Sims and Kienzle 2009.
6. Ingle 2011.
7. OECD 2014.
8. Kienzle 2013.
9. Faleye and others 2014
10. Sims 2006.
11. The Philippines was excluded from the graph 4.3 because the price of the import permit for agricultural machinery is calculated as a percentage of the cost value.
12. Murphy and Buckmaster 2015.
13. Springfeldt 1996.

References:

- Faleye, T., A.J. Farounbi, O.S. Ogundipe and J.A. Adebija. 2014. "Testing and Evaluation of Farm Machines: An Essential Step for Developing Mechanization in Nigeria." *International Research Journal of Agricultural Science and Soil Science* 4 (2): 47-50.
- FAO and UNIDO. 2008. "Agricultural Mechanization in Africa: Time for Action. Planning Investment for Enhanced Agricultural Productivity." Report of an Expert Group Meeting January 2008, Vienna, Austria: FAO and UNIDO.
- Houmy, K., L. Clarke, J. Ashburner and J. Kienzle. 2013. "Agricultural Mechanization in Sub-Saharan Africa: Guidelines for Preparing a Strategy." *Integrated Crop Management* 22. Rome: FAO.
- Ingle, C. 2011. *Agricultural Tractor Test Standards in America*. Washington, DC: The Catholic University of America.
- Kienzle, J., J. Ashburner and B. Sims. 2013. "Mechanization for Rural Development: A review of patterns and progress from around the world." *Integrated Crop Management* 20.
- Murphy, D., and D. Buckmaster. 2015. "Rollover Protection for Farm Tractor Operators." Cooperative Extension E-42, University Park, PA: Pennsylvania State University College of Agricultural Sciences, Agricultural and Biological Engineering.
- OECD (Organisation for Economic Co-operation and Development). 2014. *OECD Standard Codes for the Official Testing of Agricultural and Forestry Tractors*. Paris: OECD.
- Sims, B. 2006. "Addressing the Challenges Facing Agricultural Mechanization Input Supply and farm product processing." Agricultural and Food Engineering Technical Report 5, FAO, Rome.
- Sims, B., and J. Kienzle. 2009. "Farm Equipment Supply Chains. Guidelines for Policymakers and Service Providers: Experiences from Kenya, Pakistan and Brazil." Agricultural and Food Engineering Technical Report 7, FAO, Rome.
- Springfeldt, B. 1996. "Rollover of Tractors—International Experiences." *Safety Science* 24.