3. Supporting Innovation and Entrepreneurship in World Bank Group Projects

The World Bank Group supports investment and advisory projects that help build innovation capacities and improve incentives for private enterprises to invest in innovations. These projects are intended to address the issues related to the enabling environment and the four targeted areas discussed in chapter 1 (Figure 1.1). This chapter describes the characteristics of these projects and the types of interventions and mechanisms that have been used to implement them. The analysis is based largely on data from a portfolio review of projects that supported innovation and entrepreneurship based on IEG’s criteria (Appendix B).

The chapter also uses a country lens to get a better sense of the extent to which Bank Group activities fostered innovation and entrepreneurship at the country level. IEG examined the projects that were implemented during the evaluation period in five countries at different stages of development. The choice of countries was based on the extent of Bank Group involvement in innovation and entrepreneurship projects, as well as the countries’ inclination to undertake innovative initiatives.

In addition to its lending and non-lending portfolio, the World Bank supports innovation policies that complement its efforts through initiatives by the World Bank Institute and infoDev (Box 3.1 and Box 3.2). The World Bank Institute supports the Bank’s operational work and its country clients with new approaches to capacity development. The Institute works in seven thematic areas: climate change, fragile
and conflict-affected states, governance, growth and competitiveness, health systems, public-private partnerships, and urban development.

**Box 3.1. Knowledge and Innovation at the World Bank Institute**

The World Bank Institute supports Bank clients in three main areas:

- **Open Knowledge:** This area connects World Bank Institute clients to global knowledge and learning about the “how” of reform. In fields where content is mature, the Institute codifies global knowledge into training programs to help its clients test development know-how. Such courses can be found on the new e-learning platform, the e-Institute. The World Bank Institute also supports peer-to-peer learning and helps broker knowledge exchanges among developing countries. It encourages Bank country teams to incorporate knowledge exchanges in country programs and is promoting the Global Development Learning Network as a worldwide knowledge exchange implementation platform.

- **Collaborative Governance:** This helps clients mobilize for collective action by building multistakeholder coalitions that require effective and inclusive leadership as well as new forms of collaboration. The Institute offers four collaborative governance business lines:
  - Open Government and Open Aid
  - Capacity Building for Nongovernmental Actors
  - Citizen Engagement through ICT
  - Multistakeholder Collaborative Action.

- **Innovative Solutions:** The Institute is developing tools, methods, and online platforms to facilitate an open and collaborative development process among governments, citizens, and other stakeholders. Its work in this area has three parts:
  - Open Data and Open Government: The Institute has made data on more than 7,000 development indicators available for public use and in searchable, downloadable, and machine-readable formats. Examples of products that build on this are Mapping for Results and the Open Aid Partnership.
  - Competitions and Challenges: The Global Apps for Development competition creates useful and innovative software applications using World Bank development data. Based on the competition, a new platform has also been customized that enables the World Bank to launch an array of competitions and challenges. The Institute also administers a $1.2 million Innovation Fund that supports World Bank staff in advancing ideas to improve development outcomes.
  - Scaling Social Enterprises: The Bank launched the Development Marketplace in 2001 to position social entrepreneurs as the third arm of development, along with public and commercial private sectors. Since then, more than 300 global groups have won $200,000 each in grant funding. In 2011, the Development Marketplace was expanded with the launch of the Development Marketplace Investment Platform.

*Source: World Bank Institute.*
The Information for Development program (infoDev) is a global partnership program and a key pillar of the ITE Practice in FPD. It pilots new initiatives on high-growth entrepreneurship, especially on business incubation and early-stage financing. Prior to its placement within the FPD Network, the program was a part of the Global Information and Communications Department as a research, capacity-building, and advisory service focused on using ICT to help promote sustainable development and reduce poverty. infoDev collaborates with different parts of the World Bank Group that are working on entrepreneurship. It is currently involved in four types of activities: business enablers, networks and capacity building, access to finance, and knowledge products (Box 3.2).

**Box 3.2. InfoDev’s Support for Innovation and Entrepreneurship**

**Business enablers (incubators, innovation centers, business acceleration programs):** infoDev’s incubation activities began with the Global Business Incubator Initiative in 2002. The goals of this initiative is to improve the performance of existing incubators and facilitate the development of new ones; promote knowledge generation and dissemination; foster national and international partnerships and networks; and foster ICT-enabled innovation. infoDev’s incubation activities have since expanded to include agribusiness innovation centers, climate innovation centers, and mobile innovation programs (mLabs/mHubs, centers where entrepreneurs can find technical assistance, networking opportunities, and testing support for new applications). As of FY12, the incubation network had nearly 240 incubators in more than 90 developing countries; these assist 20,000 enterprises. It also established four mLabs and has established climate innovation center programs in six countries.

**Networks and capacity building:** infoDev provides networking opportunities for entrepreneurs, private sector investors, and the donor community—through events (the annual Global Forum for entrepreneurs and SMEs), through business plan competitions and SME fairs, and through social networks. It also supports capacity-building initiatives that are targeted to policy makers, incubation managers, and trainers.

**Access to Finance:** Recently, infoDev launched a new program on Access to Finance. The program intends to design and pilot early-stage financing facilities. Some of the planned infoDev initiatives include Angel Co-investment and Technical Assistance, which consists of an early-stage innovation and financing facility, an incubator attached seed financing facility, and an innovative micro, small, and medium-size enterprise finance facility for the Caribbean.

**Knowledge products:** infoDev provides research to identify unique and innovative development opportunities and knowledge products, including policy guidance on approaches to licensing, competition, and universal access and on bandwidth sharing, mobile broadband, and net neutrality through good practice examples and benchmarks based on global experience. In FY10 and FY11, it commissioned or completed 19 policy-related studies (including five guideline manuals, five studies, three workshops, one focus group, and one case study).

*Source: infoDev.*
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SUPPORTING INNOVATION AND ENTREPRENEURSHIP IN WORLD BANK GROUP PROJECTS

World Bank Group Lending and Investment Portfolio for Innovation and Entrepreneurship

WORLD BANK LENDING

Word Bank lending for projects that support innovation and entrepreneurship is directed toward governments in client countries. Funds are provided as direct support (loans and grants) to governments and are channeled to entrepreneurs through public sector institutions or public-private sector arrangements. In some cases, the private sector acts as the implementing agency for a government-run project.

IEG identified a lending portfolio of 119 projects—64 closed and 55 active, located in 60 countries—that included activities relating to innovation and entrepreneurship with total lending volume of $8.2 billion between FY00 and FY12. Of these projects, 106 identified lending that specifically supported activities related to innovation and entrepreneurship. Lending for closed Bank projects in this evaluation accounted for around 2 percent of total volume of Bank lending for projects that exited during this period.

Bank support for innovation and entrepreneurship projects responds to demand from its client countries. These projects, once concentrated in middle-income countries, are increasingly found in lower-income countries (appendix table D.2). If active projects are used as a proxy for recent lending efforts, the trend in distribution of lending activities suggests that Bank support for innovation and entrepreneurship may be shifting. The Africa Region had the largest number of projects, both closed and active. However, average lending per project in the region was the smallest (appendix table D.3). Among the sectors, FPD had the largest number of both closed and active projects (appendix table D.4). Figure 3.1 shows the distribution of projects in each Bank Group institution.
IFC INVESTMENTS

IFC provides support for innovation and entrepreneurship by client companies, making investments directly in start-ups and existing companies that are willing to take risks and generate and/or disseminate new or improved products, processes, and marketing models. In this way, IFC’s innovation and entrepreneurship investments are helping bring products, processes, services, and forms of business organization or marketing that are new to its client companies or even to countries in which its clients operate. In many investments, IFC also brings in foreign companies with considerable technological and business capabilities as co-investors or technical advisors, providing important channels and ideas for innovation.

IEG identified 300 IFC innovation and entrepreneurship projects in client companies located in 82 countries with total commitments of $5.7 billion between FY00 and FY11 (appendix table D.5). Of the 300 investment projects considered, 203 had
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Evaluation finding. These evaluated projects correspond to about 20 percent of the volume of all IFC projects evaluated during the study period.

Projects were concentrated in lower-middle-income countries, with about two-thirds of those in China and India (appendix table D.6). The number of these projects and investment commitment per project varied significantly across the regions. The Europe and Central Asia Region had the largest number of projects, followed by the Latin America and the Caribbean Region. East Asia and Pacific had the largest investment commitment per project, implying fewer projects but a larger volume of investment commitments (appendix table D.7). The top three sectors with these projects were manufacturing, financial markets, and agriculture and forestry (appendix table D.8).

MIGA GUARANTEES

MIGA provides political risk insurance to investors and lenders against noncommercial risks, primarily transfer restriction, expropriation, and war and civil disobedience. MIGA’s guarantee coverage facilitates FDI that brings new products, processes, business organization, and innovations in marketing and distribution. These innovations are important because they have direct effects on businesses and consumers as well as significant demonstration effects when they are copied and replicated by local firms.

For this review, IEG identified 108 innovation-related projects in 53 countries, issuing $4.8 billion guarantees between FY00 and FY12 (Figure 3.1; appendix table D.9). The 108 MIGA projects accounted for about 30 percent of the number of guarantees issued during this period.

Forty-seven percent of investment guarantees issued were in low-income countries. Sub-Saharan Africa accounted for the largest volume, followed by Europe and Central Asia. These two regions accounted for about two-thirds of the total volume of guarantees. Innovation projects in the Latin America and the Caribbean Region had the largest average volume of guarantee issued per project. About 16 percent of projects involved South-South transactions. In terms of sector focus, the largest number of projects was in agribusiness. However, the largest volume of guarantees issued for innovation projects was in infrastructure, where projects tend to be large scale, with substantial investments in fixed assets.
Design of Bank Group Innovation and Entrepreneurship Projects

Productivity growth and competitiveness are important determinants of economic and social progress. Increases in productivity can arise from efficiency gains in existing businesses or reallocation of resources from less productive to more productive firms. However, market and government failures as well as other bottlenecks can pose multiple constraints to growth and development (appendix A).

The World Bank, IFC, and MIGA design and implement different types of interventions that support entrepreneurship at different stages. The Bank helps governments address policy functions affecting innovation, such as providing support to innovative activity, reducing obstacles to innovation, funding relevant R&D, fostering dissemination and use, and supporting monitoring and evaluation (M&E) (World Bank 2010b).

IFC and MIGA interventions focus mainly on private firms, assisting them with production, delivery, and scaling-up of new or improved processes, business models, and forms of marketing and business organization. About half of IFC’s Advisory Services work is with governments. Each institution designs and implements interventions that are consistent with its mandate and comparative advantage, but the overall effort encompasses an array of interventions that can be used to foster innovation and entrepreneurship in a range of development contexts.

World Bank Group–targeted interventions to foster innovation and entrepreneurship consist of support to public and private R&D, strengthening entrepreneurial capabilities, financing early stage start-ups, and fostering linkages between actors in the innovation system. Bank Group institutions emphasize different types of interventions, with the Bank focusing more on support for R&D infrastructure, strengthening entrepreneurial capabilities, and fostering linkages mainly between research-universities and industry. IFC emphasizes firm-level issues such as strengthening entrepreneurial capabilities and financing early-stage start-ups, and MIGA focuses almost exclusively on strengthening entrepreneurial capabilities.

World Bank Interventions Supporting Innovation and Entrepreneurship

The World Bank has a diversified lending portfolio to support innovation and entrepreneurship. Targeted interventions have focused on building the R&D infrastructure and regulatory regime to develop new technologies and inventions; strengthening entrepreneurial capabilities; and, to a lesser extent, financing schemes and fostering linkages between public research systems and firms (Figure 3.2).
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Figure 3.2. World Bank Interventions Supporting Innovation and Entrepreneurship

<table>
<thead>
<tr>
<th>Support to public R&amp;D</th>
<th>Number of projects with intervention</th>
<th>Share n = 119</th>
</tr>
</thead>
<tbody>
<tr>
<td>R&amp;D funding</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>R&amp;D capacity building</td>
<td>56</td>
<td>71%</td>
</tr>
<tr>
<td>Metrology, standards, and quality</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Intellectual property rights</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Support for capacity building</td>
<td>21</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Strengthen entrepreneurial capabilities</th>
<th>Number of projects with intervention</th>
<th>Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skills development to SMEs/farmers</td>
<td>53</td>
<td>65%</td>
</tr>
<tr>
<td>Technology diffusion/transfer</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>Venture capital</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Financing schemes</th>
<th>Number of projects with intervention</th>
<th>Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loans/grants to SMEs</td>
<td>12</td>
<td>15%</td>
</tr>
<tr>
<td>Business incubators</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>University-industry linkages</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Research-extension and farmer linkages</td>
<td>11</td>
<td>29%</td>
</tr>
<tr>
<td>Other linkages</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

Source: IEG.

SUPPORT FOR PUBLIC R&D

The Bank provides support for public R&D because in the absence of countervailing institutions, particular types of market failures lead to the under-provision of certain types of public goods, such as research, that are necessary for the generation of basic knowledge and technologies that entrepreneurs can commercialize. To respond to inadequate provision of such public goods and services, the World Bank has provided funding to:

- Build or strengthen the technological infrastructure for R&D in public research institutions and S&T parks to conduct basic and applied research to develop new and improved technologies
- Support public universities, particularly science and mathematics departments and research labs
- Build or strengthen national quality infrastructure, including institutions, laws, and regulations
- Support capacity for policy, program, and strategy related to innovation capability and competitiveness.
Support for research and technological infrastructure has been used to develop and diffuse new and improved technologies that help improve firm-level productivity and strengthen competitiveness (Figure 3.2). Eighty-five of the 119 innovation projects supported by the Bank—71 percent—included activities that supported investments in research and technological infrastructure. These interventions were concentrated in low-income countries, mainly through funding for physical infrastructure, research facilities, and capacity building of research and scientific staff. Priority was given to capacity building of research staff aimed at promoting S&T outputs. In middle-income countries, there was more emphasis on strengthening national quality infrastructure.

Bank-supported R&D was mostly in ARD, education, and FPD. In agriculture, for example, the Peru Agricultural Research and Extension Project (1999) sought to increase the productivity and competitiveness of the agricultural sector through the adoption of environmentally sound technologies. Project components included an agricultural technology fund that provided competitive research grants to research and extension institutions and institutional strengthening activities to help build capacity in the national technology system.

Some education interventions focused on building scientific capacity to enhance innovation. For example, the Chile Millennium Science Initiative’s (1999) objective was to improve the performance of the Chilean S&T system. Project components included a competitive fund for scientific excellence and the creation of a network to promote scientific excellence. In addition to the competitive funds, other mechanisms used to implement these interventions included technical assistance for selected science institutes, funding for scientific infrastructure, equipment and fellowships, and exchange programs with advanced research institutions.

In FPD, the focus was mainly on strengthening national quality infrastructure in public institutions. For example, the objective of the Ghana Private Sector Development Project (1994) was to foster the development of a competitive private sector by helping the government develop appropriate technology and improved knowledge of quality and standards. The project enabled capacity building to strengthen the role of Ghana National Standards Body in developing national quality infrastructure and disseminating these services across the country. Another project, the Nicaragua Micro, Small, and Medium-Size Enterprise Development Project (2008), supported quality and certification services by strengthening the national quality control laboratory and Ministry of Health certification office.

The incentive problem is another issue that impedes innovation; some innovative individuals and firms do not attempt to gain the full benefits of an innovation.
because others can easily copy their ideas. Firms in a competitive environment may underinvest or not invest at all in transforming R&D outputs into commercial products when they cannot prevent other investors from imitating and providing their innovation without getting any financial benefits. The World Bank addressed incentive problems by supporting IPR regimes to better connect firms to products from R&D and R&D funding.

Six projects, accounting for 5 percent of innovation projects, incorporated interventions that addressed IPR regimes, mainly in upper-middle-income countries. IPR regime interventions are designed to provide the incentive to commercialize inventions. These interventions helped promote IPR regimes in client countries to bring them in line with international standards. The expectation is that clearer and better-enforced IPR regulations would provide incentives for entrepreneurs to commercialize R&D products, resulting in more innovations being brought to market. In the Turkey Industrial Technology Project (1999), the Bank helped strengthen industrial property rights and services by supporting improved patent filing and search examination procedures; establishing dedicated information centers for documentation and information dissemination; and enforcing industrial property rights.

**STRENGTHENING ENTREPRENEURIAL CAPABILITIES**

Firms play a central role in the innovation process. In some cases, information asymmetries result in firms and potential entrepreneurs not having the necessary information to seize potential business opportunities. Beyond market failures, capability failures can be another key bottleneck in innovation processes. Managerial deficits, lack of technological understanding, and limited learning ability or “absorptive capacity” to make use of externally generated technology capabilities may exist. To address these failures, Bank Group interventions provided support to help build managerial and entrepreneurial capabilities in firms and support for enterprise innovation and upgrading, including introduction of new products into markets, technology transfer, and technology diffusion.

Sixty-five percent of innovation and entrepreneurship interventions supported strengthening of entrepreneurial capabilities, with a majority of these supporting skills development for SMEs and farmers. Technical assistance and capacity building have focused on management training, helping firms acquire skills through experience, and business development services and providing a wide range of support to help firms start or run a company. These interventions were concentrated in low- and lower-middle-income countries, where they accounted for more than two-thirds of all Bank support for strengthening entrepreneurial capabilities.
An important focus of World Bank Group interventions was on strengthening entrepreneurial capabilities in SMEs, with a view to improving firm-level competitiveness, growth, and access to markets. For example, the overall objective of the Uganda Private Sector Competitiveness Project (2004) was to create sustainable conditions for enterprise creation and growth that responded to local and export markets. Project components included enhancing enterprise competitiveness aimed to improve enterprise capacity by encouraging investment in skills; raising productivity; and improving the quality, standards, and reliability of micro, small, and medium-size enterprise producers in export value chains. Mechanisms used to implement this intervention included a matching grant scheme and competitive grant scheme for business plan development. In Nicaragua, the Micro, Small, and Medium-Size Enterprise Development Project’s (2008) objective was to improve the competitiveness of such firms and the business climate affecting them. Matching grants were used to help introduce new products or processes and reduce the time needed to start a business. These grants also financed other activities, such as quality enhancements and certification, innovation, labor training, and clean technologies.

Some Bank interventions have supported the introduction of new climate change products into markets. For example, climate change innovations are being introduced in many markets. In a World Bank project in Sri Lanka, output-based aid and innovative financing arrangements were used to successfully introduce a new renewable energy technology—solar photovoltaic home systems—into the market (IEG 2010). Several water efficiency projects in China used satellite-based measures of crop evapotranspiration, an innovative approach, to measure actual water use (IEG 2012b).

**Financing Schemes**

A problem with innovation investments is that they are often risky, with uncertain outcomes. Such investments are not attractive to banks and other financing institutions, which are thus less likely to provide financing. In addition, many innovative projects have a relatively low probability of success and may turn in profits over a longer time frame than conventional financing institutions expect. This inherent uncertainty of success results in limited financing; consequently, firms may underinvest in innovative projects.

In response, the Bank Group has provided financial support for early-stage start-ups through venture capital funds, as well as loans and grants to innovative and entrepreneurial companies and SMEs. However, this has not been a major area of focus for the Bank. For example, IEG identified six venture capital funds—four in upper-middle-income and one each in low- and lower-middle-income countries—that the Bank supported in the innovation and entrepreneurship lending portfolio.
One such fund was a component in the Argentina Unleashing Productive Innovation Project (2008); it promoted the development of new knowledge-based companies by establishing a pilot venture capital fund for technology sectors with an emphasis on early-stage financing. The objective of the venture capital fund was to make early-stage finance available for technology start-ups and to provide a demonstration effect to show that these investments were commercially viable. The Bank also supported entrepreneurs through grants and soft loans for concept development, business planning, export support, and company accreditation.

**Fostering Linkages between the Actors in the Innovation System**

Technological development and innovation processes are complex, so effective linkage between different policies and relevant actors in the innovation system is critical for success. Linkages can be among domestic and foreign firms and with universities, research institutions, and technology intermediaries, as well as with the Diaspora. Bank Group activities supporting linkages included the following:

- Research-university industry linkages
- Research-farmer-research extension linkages
- Business incubators, providing a range of services to start-ups and young firms and link them
- Platforms such as the Innovation Policy Platform developed by the World Bank and OECD.

Thirty-four projects—29 percent of World Bank projects—fostered linkages between the actors in the innovation system. Around half of these linkages were between industry and the private sector. Their objective was to commercialize R&D products that had been produced in public R&D institutions and universities. Most of the interventions fostering linkages were in agriculture, but some others sought to strengthen linkages between academia and industry. For example, the objective of the India National Agricultural Innovation Project (2006) was to contribute to the sustainable transformation of Indian agricultural sector from a primary focus on food self-sufficiency to one based on market orientation. One of the project components involved establishing research consortia to facilitate dialogue and interactions among public research organizations, farmers, private sector, and other stakeholders to support agricultural transformation. Mechanisms to implement project interventions included competitive grants for research activities, grants for establishing research consortia, and capacity building.

In education, the Uganda Millennium Science Initiative (2006) supported universities and research institutes to produce more and better-qualified science and engineering graduates, higher-quality and relevant research, and enhanced linkages
between research and industry. One project component provided grants for “technology platforms” through which private firms and researchers defined collaborative agendas and pursued relevant solutions to issues faced by industry.

The commercialization of R&D outputs involves the transformation of inventions into new products, processes, or services that start-ups or existing companies can develop and bring to the market. The Croatia S&T Project (2005) is a good example. One of the project programs supported collaboration between the private sector and research institutes through a matching grants scheme that financed 20 projects. A new generation of projects has put much more emphasis on promoting S&T that is linked to competitiveness and industry productivity. Such projects include Chile Science for the Knowledge Economy Project (2003), Mexico Innovation for Competitiveness Project (2005), the Uruguay Innovation Loan (2007), and Argentina Unleashing Productivity Innovation Project (2009).

The World Bank has also supported business incubators by offering them a variety of support resources and services. Business incubators link innovation and entrepreneurship and help bring new ideas to the market, contributing to jobs and economic growth. When successful, they can create strong linkages among financiers, universities, policy makers, and firms (Khalil and Olafsen 2010). The Bank has provided funding for government operation or subsidized business incubators to help start-ups and innovative SMEs commercialize their innovation and grow into successful firms. For example, the Bank supported the establishment of the Enterprise Incubator Foundation in Armenia in 2002 to help develop its information technology sector. The project provided a comprehensive package of services to Armenian information technology firms through business linkage services, skill development services, and managed workspace. More recently, the Bank and IFC have supported business incubators through grants to infoDev (appendix box D.1).

The Bank Group’s ICT department has facilitated collaboration among governments, development partners, and the private sector to leverage external sources of knowledge and expertise. For example, the Bank helped structure a partnership between Moldova and Singapore in which Singapore provided technical assistance to help design Moldova’s e-government efforts. A knowledge platform on ICT was developed as a joint initiative between the Bank’s ICT unit and the World Bank Institute to focus on linking clients and staff with external sources of knowledge and expertise in the sector (IEG 2011b).

The World Bank and OECD jointly developed the Innovation Policy Platform to foster the use of innovation policies and programs to increase sector and firm
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competitiveness across industries and countries (Box 3.3). It is a Web-based open
data interactive platform aimed at facilitating collective learning processes around
STI policies. Its goal is to provide its users—innovation policy makers and
practitioners globally—with support in analyzing innovation systems and policies
and in shaping future policy design.

Box 3.3. World Bank–OECD Innovation Policy Platform

The Innovation Policy Platform will mobilize global resources, knowledge, and expertise to
help policy practitioners learn about various elements of innovation policy design,
implementation, and M&E, as well as identification and prioritization of the good practice
solutions most appropriate for their contexts. This open-data interactive platform will
facilitate knowledge exchange and peer-to-peer learning among policy makers and
practitioners in developed, emerging, and developing countries through:

An open data portal of up-to-date knowledge on innovation policy globally
Interactive search networks and communities of practice to locate explicit and tacit
knowledge and skills and identify solutions to specific innovation policy needs
Feedback and peer review structures to enhance the learning opportunities and allow the
platform to be an active instrument for policy debates.

The project that will build this platform involves better codification and packaging of
existing innovation knowledge.

Sources: OECD and World Bank 2009; World Bank FPD.

MAIN MECHANISMS USED TO SUPPORT INNOVATION AND ENTREPRENEURSHIP

Bank projects used different mechanisms to implement interventions that support
innovation and entrepreneurship. These mechanisms included competitive fund
mechanisms, such as competitive research grants and matching funds. In many
cases, several mechanisms were combined to implement an intervention.

Support for Public R&D

Competitive Research Grants. The competitive research grant (CRG) is an
important mechanism that has been used to help improve performance and
efficiency in public research systems, improve the research-industry link, and
promote private sector participation in public sector research. With CRGs, research
providers are selected on a competitive basis, based on technical proposals and peer
review.

At the World Bank, CRGs have been used mainly to support agricultural innovation,
although they have also been used to improve the quality and relevance of higher
education and to strengthen linkages among national quality infrastructure, standards bodies, and private industry in PSD. Eighteen Bank projects used CRGs to improve performance in public research systems; the ARD and education sectors used it most frequently. In ARD, CRGs were often linked to agricultural research funds that supported agricultural research, technology transfer, and extension, as well as the provision of agricultural services. Education projects have used CRGs to improve the quality and relevance of education in public R&D institutions and universities.

**Training and Technical Assistance.** This kind of assistance activity has supported capacity building in S&T for basic and applied research and national quality infrastructure in public research institutes and enhanced public research and/or university linkages with industry. Main mechanisms include scholarships and grants for training at master’s, doctoral, and postdoctoral levels and twinning arrangements and other forms of collaboration with international research institutions, laboratories, and universities.

**Strengthening Entrepreneurial Capabilities and Linkages**

**Matching Grants.** Entrepreneurs play an important role in commercializing R&D products that have been developed through public R&D institutions and universities. The World Bank has provided subsidies to help firms commercialize R&D products developed in public research institutions. Matching grants, in which the Bank provides a partial subsidy to firms, have been used to facilitate development of new products through collaboration between firms and R&D institutions. Nine projects have used this mechanism to facilitate such collaboration, with the expectation that grant funding would provide incentives for entrepreneurs to bring innovations to market.

Matching grants have also been used to help entrepreneurs finance the cost of business development services, export promotion activities, and technology upgrading. This mechanism was used in 23 projects to support business development and consulting services, mainly by FPD.

The Bank Group also supported innovation and entrepreneurship through the World Bank Institute’s Development Market Place.

**IFC Investments Supporting Innovation and Entrepreneurship**

IFC’s innovation and entrepreneurship projects focus almost exclusively at the firm level, with interventions that aim to strengthen entrepreneurial capabilities mostly through incentives for firm-level growth through technological upgrading and
financial support for early-stage start-ups. IFC’s investments have supported firm expansion and growth through technology upgrading. This occurs through four main channels: technology transfer or technology diffusion, upgrading existing products and processes, firm-level R&D for product development, and introduction of innovations into the market. Seventy-four percent of projects have supported technology upgrading efforts mainly by helping firms upgrade existing products and processes and technology exchange (see Figure 3.3).

**Figure 3.3. IFC Interventions to Support Innovation and Entrepreneurship**

<table>
<thead>
<tr>
<th>Interventions</th>
<th>Number of projects with intervention</th>
<th>Share (n = 300)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology transfer/diffusion</td>
<td></td>
<td>92</td>
</tr>
<tr>
<td>Upgrading existing products and processes</td>
<td></td>
<td>108</td>
</tr>
<tr>
<td>R&amp;D for Product Development</td>
<td></td>
<td>22</td>
</tr>
<tr>
<td>Establishment of new institutions</td>
<td></td>
<td>34</td>
</tr>
<tr>
<td>Introduction of new products and services</td>
<td></td>
<td>25</td>
</tr>
<tr>
<td>Early stage financing through venture capital fund</td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>Early stage financing directly to the company</td>
<td></td>
<td>7</td>
</tr>
</tbody>
</table>

**Source:** IEG.

IFC’s financing for acquiring new technology and for technology transfer interventions is mainly supported by its manufacturing sector, accounting for 45 percent and 35 percent of such interventions, respectively. Agribusiness and forestry also support about a quarter of all interventions that help firms acquire new technology and technology transfer. Through these interventions, IFC helps link companies to a global pool of technology, knowledge, human capital, and learning by doing.

IFC interventions supporting firm-level upgrading and modernization efforts as well as introduction of new products, processes, and institutions were concentrated in lower-middle-income countries. For example, IFC provided long-term foreign currency debt financing to a leading Indian Pharmaceutical Company (2009) to support its expansion into China. The project involved South-South technology exchange and knowledge transfer. In another project, IFC supported a leading soft drink bottler and distributor to transfer a successful business model from Asia and
Africa. This investment also enabled the company to transfer its technology from one frontier market to another.

Innovations also occur when new products, processes, or marketing or organizational models are introduced. IFC has provided loans and equity support for start-up companies and innovative firms that are willing to take risks to introduce new products and services. Twenty percent of IFC’s interventions helped firms introduce innovation into markets, mainly through the establishment of new financial institutions and the introduction of new products or services. These interventions were mainly in financial markets: 94 percent of cases where financial institutions were established and 68 percent of cases where client firms introduced new products, such as equipment leasing and credit bureaus into markets.

IFC investments have fostered innovation by helping start-ups and innovative firms introduce new products, services, and business models to the market. For example, it has supported clients that introduced new leasing operations in Peru and Tanzania, new insurance products in the Middle East and North Africa, software technology in new export markets, new products and flexible pricing schemes in the information technology sector in Paraguay, new financial products in many countries in all regions, and clean energy technology or energy efficient products in several regions.

Both the World Bank and IFC have supported index insurance schemes that offer the advantages of insurance to farmers and livestock keepers at lower cost than traditional approaches (IEG 2012b). Some of these interventions involve new ways of delivering financial services to underserved segments of the population. In many cases the innovations are intrinsically inclusive. For example, IFC’s support for a microfinance institution in the Democratic Republic of the Congo reduced the cost of opening a bank account, increased access to banking facilities, and enhanced the affordability of a wide range of financial services to previously underserved populations.

The returns on investments by innovative firms may be high, but capital markets may not provide long-term capital for risky ventures with uncertain outcomes. This is particularly difficult for new firms, because they do not have a track record or collateral, which banks require for making loans. The problem is compounded when the firms are start-ups based on new, untried technology that they have developed or are trying to implement for the first time. Success may bring high financial gains or negative returns. For such cases, IFC has invested in venture capital funds that pool and manage money from investors who take private equity stakes and invest in start-up companies and SMEs with strong growth potential.
IEG identified a subset of 12 venture capital funds from IFC’s broader equity portfolio that focused on early-stage companies and innovative SMEs mainly in lower-middle and upper-middle-income countries. Many of these funds were small, ranging from $2.5 million to $25 million. In some cases, IFC has taken a place on the board of directors of these funds. The focus on risk financing for early-stage start-ups is important because start-ups with untried technologies or without a market track record tend to experience greater access constraints to finance, posing acute barriers to their growth (Dahlman 2013).

IFC investment in venture capital funds provides early-stage companies and innovative SMEs with equity capital as well as managerial expertise, market information, and other forms of technical assistance. For example, IFC invested in a private equity fund that targeted early-stage venture equity and quasi-equity investment opportunities in Indian high-technology and high-growth equity companies. The project was created to help SMEs by providing scarce capital, managerial talent, and market information. IFC has also invested in regional funds that involved establishing a venture capital fund to make equity and quasi-equity investments in private sector small and medium-sized companies in the South Pacific Island countries. In a few cases, IFC has also provided equity and quasi-equity investments directly to start-ups and high-growth SMEs.

**MIGA Guarantees Supporting Innovation and Entrepreneurship**

MIGA’s efforts to promote FDI in developing countries can play a vital role in fostering innovation and entrepreneurship. By providing coverage for political risk insurance, its interventions directly address incentive problems that may cause firms to underinvest in innovative products and processes. The main channels through which MIGA’s support for FDI fosters technology upgrading in client firms were technology transfer (in 37 percent of innovative projects) and acquisition of new production technology and processes (in 28 percent of innovative projects).

Technology-upgrading interventions provided important channels for the flow of technologies and know-how between a foreign investor and client in a developing country.

MIGA’s support for innovative interventions focuses on strengthening entrepreneurial capabilities by facilitating firm growth and expansion through (i) transfer of technology or equipment, (ii) transfer of business process or practice, and (iii) capacity building through training or knowledge transfer. The bulk of the technology upgrading interventions were in infrastructure, with the sector accounting for 50 percent of support for technology transfer and 40 percent of
acquisition of new technology and processes. For example, MIGA issued a guarantee in a project that supported the construction and operation of a seawater desalination plant in China. The project involved the transfer of technology and know-how on advance water treatment technology from Norway to China through a joint venture enterprise.

In another project, MIGA supported South-South investment by providing a guarantee contract for a project to design, construct, and operate the first geothermal plant in Kenya. Through its support for foreign private investment in this project, MIGA helped introduce geothermal technology, know-how, and managerial expertise to Kenya. In another South-South transaction, MIGA’s insurance coverage helped investors from India provide new and simple technology for roofing products in Nigeria. In all these cases, MIGAs insurance coverage was critical in facilitating technology upgrading, innovation and knowledge flows through technology transfer, technology diffusion, and acquisition of new technology that supported firm growth and expansion.

In 35 percent of projects, MIGA supported client firms in introducing new products and processes into the market. These interventions included support for the establishment of new financial institutions, such as the first leasing company in Serbia and Montenegro, or support for a new mobile banking services and payment system in Sierra Leone. Financial services dominated interventions that introduced innovations into markets, accounting for about two-thirds of such interventions.

World Bank Group Knowledge Activities Supporting Innovation and Entrepreneurship

**World Bank Advisory and Analytic Activities**

The World Bank supported client countries through AAA comprising economic and sector work (ESW) and technical assistance. A review of a random sample of 250 closed and active AAA projects implemented between FY00 and FY11 found that 36 percent of these projects involved innovation and entrepreneurship projects. Of these, ESW dominated, accounting for 66 percent of such work.

These studies focused on broad issues such as innovation policy, knowledge economy, and technology, mainly to inform government policies. Technical assistance, accounting for 34 percent of innovation-related AAA, focused on strengthening institutions and clients’ capacity to implementing innovation projects. The Sustainable Development Network accounted for 53 percent of technical
assistance projects, and the Poverty Reduction and Economic Management Network had the most ESW projects (39 percent) (appendix figure D.1).

In a portfolio of 18 active AAA projects, 13 involved technical assistance, 4 ESW, and 1 both lending and ESW. On average, $393,222 was spent on the four ESW and $328,731 on the technical assistance projects. These projects show an increasing share of FPD in AAA projects, with the sector accounting for 8 of the 18 studies. Nine of 18 AAA projects were delivered to clients in middle-income countries, whereas only 2 of all the active AAA in innovation-related studies were in low-income countries. ESW outputs were mainly knowledge reports and policy notes intended to inform government policy or stimulate debate on various aspects of innovation policy. Technical assistance in innovation-related activities mainly involved diagnostic work, providing assistance in strategy implementation, policy guidance, institutional capacity building, and raising awareness to facilitate knowledge exchange.

**IFC Advisory Services**

IEG identified 84 IFC Advisory Services projects between FY05 and FY12—58 closed and 26 active—that had innovation-related interventions that supported entrepreneurship. At the design stage, IFC Advisory Services projects are expected to identify the market failure or firm-level constraint that the project is addressing.

Total expenditure on the 84 projects that supported entrepreneurship was about $42 million, with most spent in middle-income countries. Slightly more than half of this expenditure, $23 million, was attributed to the Access to Finance business line, and about $15 million was spent by the Sustainable Business Advisory business line (appendix table D.10).

Advisory Services innovation projects supported innovation and entrepreneurship through three major types of interventions: building entrepreneurial capabilities, management training and skill development, and institutional building or policy reform. Of these interventions, support for building capabilities in start-up and innovative SMEs was most frequent. Access to Finance and Sustainable Business Advisory business lines accounted for the majority of interventions that helped build entrepreneurial capabilities in innovative firms.

Support for building entrepreneurial capabilities was implemented with mechanisms such as technical assistance to help firms with feasibility studies, product development, and growth strategies. Innovative SMEs, such as those involved with energy-efficient technologies, received support to help them develop and bring energy-efficient products to market. In other cases advisory services were
provided to support capacity building in innovative firms. Through these grants, IFC Advisory Services supported commercialization of products from R&D, such as clean energy technologies, helping entrepreneurs bring innovations to markets.

**Country Perspectives: Design of Innovation and Entrepreneurship Interventions**

IEG analyzed intervention at the country level for all the projects implemented by the World Bank, IFC, and MIGA in Brazil, Chile, China, India, and Kenya over the evaluation period (Figure 3.4). Together these countries accounted for 27 percent of the number of Bank projects, 23 percent of IFC projects, and 10 percent of MIGA projects reviewed in this evaluation.

Brazil, Chile, and China are upper-middle-income countries and are considered leaders in pursuing innovation-driven growth in their national development strategies and CASs. The Bank Group institutions also have a track record of consistently supporting innovation and entrepreneurship projects in these countries.

India and Kenya are in the lower-middle and low-income categories, which only recently have begun to give innovation priority in national strategies and CASs. Yet both are making important strides in innovative activities, particularly in incremental and inclusive innovations that provide solutions to pressing development challenges. All these countries were included in the 10 country case studies in chapter 2, thus providing important linkages with key principles that can be used to foster innovation and entrepreneurship.

**INNOVATION IN CASs**

The CASs developed over the evaluation period for countries such as Brazil, Chile, China, and India included innovation and entrepreneurship as pillars or strategic priorities for achieving broader development objectives like strengthening competitiveness and growth.

In Chile, investments in research and innovation have been important priorities to address the country’s global competitiveness since the 1990s; these priorities continue to be important pillars in the current CAS. Country strategies in Brazil and China included innovation as a key strategic objective for strengthening competitiveness and expanding services to the poor. Innovation and knowledge, seen as crucial for delivering Brazil’s growth agenda, have been central elements in the Bank’s policy dialogue with the government. China’s CAS intends to accelerate the pace of innovation by creating an open innovation system in which competitive pressures encourage Chinese firms to engage in product and process innovation through their own R&D as well as through participation in global R&D networks.
In India, inclusive, sustainable growth and service delivery were strategic priorities in earlier CASs; innovation was emphasized in the agricultural sector, mainly to shift the focus to commercially oriented agriculture and public-private partnerships. More recently, innovation has taken a more central role in addressing the country’s development challenges, guided by government initiatives that focus on projects that transform and modernize policies and institutions, leverage resources, and pilot new and innovative development approaches.

Kenya’s early CASs mention innovation and entrepreneurship but mainly in agriculture, with the goal of achieving an innovative, commercially oriented, competitive, and modern agricultural sector. Recent CASs, however, acknowledge the importance of research in informing government policy debates and the importance of the Bank Group in introducing innovative solutions to the country’s development problems.

**Country Analysis by Targeted Innovation and Entrepreneurship Interventions**

Figure 3.4 shows the World Bank, IFC, and MIGA’s targeted interventions supporting innovation and entrepreneurship in the five countries selected for this analysis.

**Support for R&D**

The Bank has provided consistent support for R&D in all these countries, but there are important differences in the design and content of R&D interventions. In Brazil, the emphasis has been on supporting public R&D infrastructure (public research institutions; metrology, standards, and quality control infrastructure; and regulation including intellectual property rights). Chile, in contrast, emphasizes pilot initiatives to build scientific excellence and scale up the successful components into more integrated support for human capital development (master’s, doctoral, and post-doctoral work), support for policy and strategy, and stronger linkages between universities and industry.

Another model used in China supported R&D by promoting the development, adaptation, and commercialization of new technologies and standards through institutional development, strengthening national quality infrastructure, and offering study tours. These efforts included a focus on enhancing the promotion of innovation related to the environment and energy efficiency. In India, support for R&D has focused mainly on the agricultural sector and innovation systems perspectives, with researchers, farmers, and other stakeholders getting involved in setting the agricultural research agenda and public-private partnerships playing a key role in implementing sector priorities.
Bank projects supporting R&D interventions are concentrated in education, ARD, and FPD. But there are also sector differences in the content of these interventions. For example, education projects in Brazil emphasize human capital development, whereas in Chile they emphasize high-quality scientific capacity and more recently broader innovation system perspectives, including scientific capacity and research-industry linkages. ARD projects in Brazil, India, and Kenya have supported the development of R&D infrastructure and human capital in agricultural S&T development. In India, projects have also embraced innovation system perspectives that emphasize linkages between research and other actors in the innovation system. FPD projects have supported components of R&D that focus on incentives to commercialize products from R&D by strengthening IPR regimes and national quality infrastructure.
The World Bank also supported analytical work to inform strategies and investments in innovation and entrepreneurship in Brazil, Chile, and China. At the federal level in Brazil, a study was undertaken on knowledge, innovation, and competitiveness. Two studies on innovation systems addressed firm and regional competitiveness in China. Three projects in Chile aimed to strengthen government policies on innovation and inform a national strategy for innovation.

**Strengthening Entrepreneurial Capabilities**

World Bank projects in these five countries have provided support for skills development, mainly to enhance the capacity of entrepreneurs and SMEs to interact with technology development and/or adopt standards that could increase market access. In Brazil, Bank projects supported capacity building to enterprises in a project on S&T reform support and technology adaptation and diffusion. In China, World Bank efforts to strengthen entrepreneurial capabilities focused on helping firms tap into global knowledge and technology through technology transfer. In three of the four World Bank projects, there was a focus on accelerating the pace of innovation by helping Chinese firms participate in global R&D networks.

The bulk of interventions that sought to strengthen entrepreneurial capabilities were supported by IFC and MIGA, mainly through technology upgrading, knowledge flows, and skills enhancement via technology transfer, technology diffusion, and acquisition of new technologies and processes. In Brazil and Chile, IFC investments helped with the expansion and modernization of firms’ production facilities, services, and distribution networks and technology transfer, aiming to increase productivity, reduce cost, and improve efficiency. MIGA interventions that helped strengthen entrepreneurial capabilities in Brazil helped its clients establish and upgrade power networks and upgrade production facilities in agribusiness, manufacturing, and service sectors. In China, IFC’s interventions helped upgrade existing products and processes and introduce new products and services, technology transfer, and firm-level R&D for product development in manufacturing, consumer and social services, and telecom and ICT.

In India, IFC investments, in some cases combined with Advisory Services, have played important roles in introducing renewable and green products, such as solar power plants, solar roof tops, and energy-efficient street lightning. MIGA’s guarantees supported its Chinese clients in upgrading existing products and processes and technology transfer in the water, waste water, and transportation sectors. In Kenya, MIGA also supported clients that introduced new products and helped firms upgrade their technology and processes, facilitating technology and knowledge flows as well as enhancing innovation.
Financing Schemes

The five-country experience shows that a range of financing mechanisms has been used to support innovation and entrepreneurship. However, there appears to be institutional specialization; each institution uses some mechanisms more frequently. The Bank has used grants and loans, whereas IFC has used loans, equity, and a combination of these. MIGA exclusively uses guarantees to support its clients.

The World Bank has used CRGs almost exclusively to support R&D in Brazil, Chile, China, and India. Matching grants were used to reduce risks and provide incentives to entrepreneurs in Bank projects in China, Chile, and India. Both the Bank and IFC have supported venture capital schemes. But IFC has been more active in this, particularly in India. IFC has also provided advisory services that helped financial institutions expand their focus on clean energy financing.

Fostering Linkages between Innovation Actors

The World Bank fostered linkages between research and industry, mainly in FPD and education projects in Brazil and Chile. In Brazil, projects supported partnerships among industries, universities, technological institutes, and government agencies and helped establish university-business innovation networks. In Chile, mechanisms such as research consortia were used to strengthen research-industry linkages. However, the limited number of such interventions in the five countries’ innovation and entrepreneurship investment portfolio suggests that the Bank Group needs to do more to help countries focus on transferring scientific results and technologies to develop solutions that address development challenges in specific contexts.

Articulating Innovation Interventions at the Country Level

World Bank Group interventions from projects reviewed in each of the five countries are summarized in Figure 3.4. Analyses of these interventions on a country basis show that—

- **Brazil:** Within the Bank Group, the World Bank was the only institution supporting R&D in Brazil. All Bank Group institutions supported entrepreneurial capabilities, but with different emphases. The Bank emphasized skills development, whereas IFC and MIGA helped strengthen firm capabilities through diverse technology upgrading efforts. The Bank also supported interventions to enhance linkages between universities and the private sector. Targeted interventions for financing entrepreneurs were not a major part of Bank Group support for innovation and entrepreneurship.
• **Chile:** The World Bank supported two projects in R&D, the first piloting interventions in building scientific excellence and the second emphasizing scale-up of relevant S&T activities, innovation strategy, and linkages between universities and industry. The Bank and IFC supported entrepreneurial capabilities but, like in Brazil, with different emphasis on skills development and technology upgrading. The Bank Group did not provide any targeted financing for entrepreneurs in Chile.

• **China:** The World Bank supported R&D in environment projects, including renewable energy and energy efficiency, consistent with the government priorities on environmental sustainability and technology transfer. All the World Bank Group institutions supported entrepreneurial capabilities, mainly by helping firms tap into global knowledge and technologies. Targeted financing for entrepreneurs was not a major part of Bank Group support for innovation and entrepreneurship.

• **India:** World Bank support for R&D focused mainly on the agricultural sector and innovation systems perspectives, as reflected in the CAS priorities. Other interventions sought to strengthen linkages among researchers, farmers, and other stakeholders in the agricultural innovation system. IFC was active in strengthening entrepreneurial capabilities and financing schemes for entrepreneurs.

• **Kenya:** Both the Bank and MIGA supported entrepreneurial capabilities, with a similar pattern in which the Bank emphasized skills development and MIGA technology upgrading. There were no interventions supporting R&D and targeted support for entrepreneurs.

The analysis of project experiences from a country perspective reveals a number of important insights on Bank Group support for innovation and entrepreneurship. First, the way innovation is addressed in CASs tends to influence investment in innovative activities. Countries that identify innovation and entrepreneurship as pillars or strategic priorities in their CAS tend to emphasize such projects in investment projects from different World Bank Group institutions.

Second, Bank Group interventions are broad and cover key elements in building innovation capacity at the country level. These interventions tend to be designed and implemented as stand-alone activities by specific sectors and different Bank institutions. Key areas, such as targeted financing for entrepreneurs and fostering linkages between actors in the innovation system, do not appear to get adequate consideration in country interventions.
Third, given the systemic nature of innovation processes, the extent to which Bank Group interventions can achieve their full potential at the country level depends on whether there are mechanisms that facilitate coordination, knowledge sharing, and joint action across different sectors and Bank group institutions.

Summary

The World Bank Group has a significant and diversified portfolio of activities to foster innovation and entrepreneurship. Current support is concentrated in lower- and upper-middle-income countries. Yet there is growing recognition that innovation is important at all stages of development. World Bank innovation-related interventions have traditionally focused on building an environment conducive to business development, supporting the R&D infrastructure, and supporting skills development and training in firms. IFC and MIGA have provided support at the firm level, mainly through technology transfer, upgrading existing technologies, and introducing new products and process. Knowledge created through analytical work also plays an important role in strengthening Bank Group policy advice on innovation strategies and policies. Analysis of Bank Group interventions from country perspectives shows that innovation and entrepreneurship interventions are designed and implemented by sectors and Bank Group institutions in ways that may not be necessarily connected.